The Electrical Industry's Weekly Magazine

March 10, 1958

Electrical World

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Price 50 Cents

Shippingport Opens Door to Full-Scale Atomic Power . . . p 54

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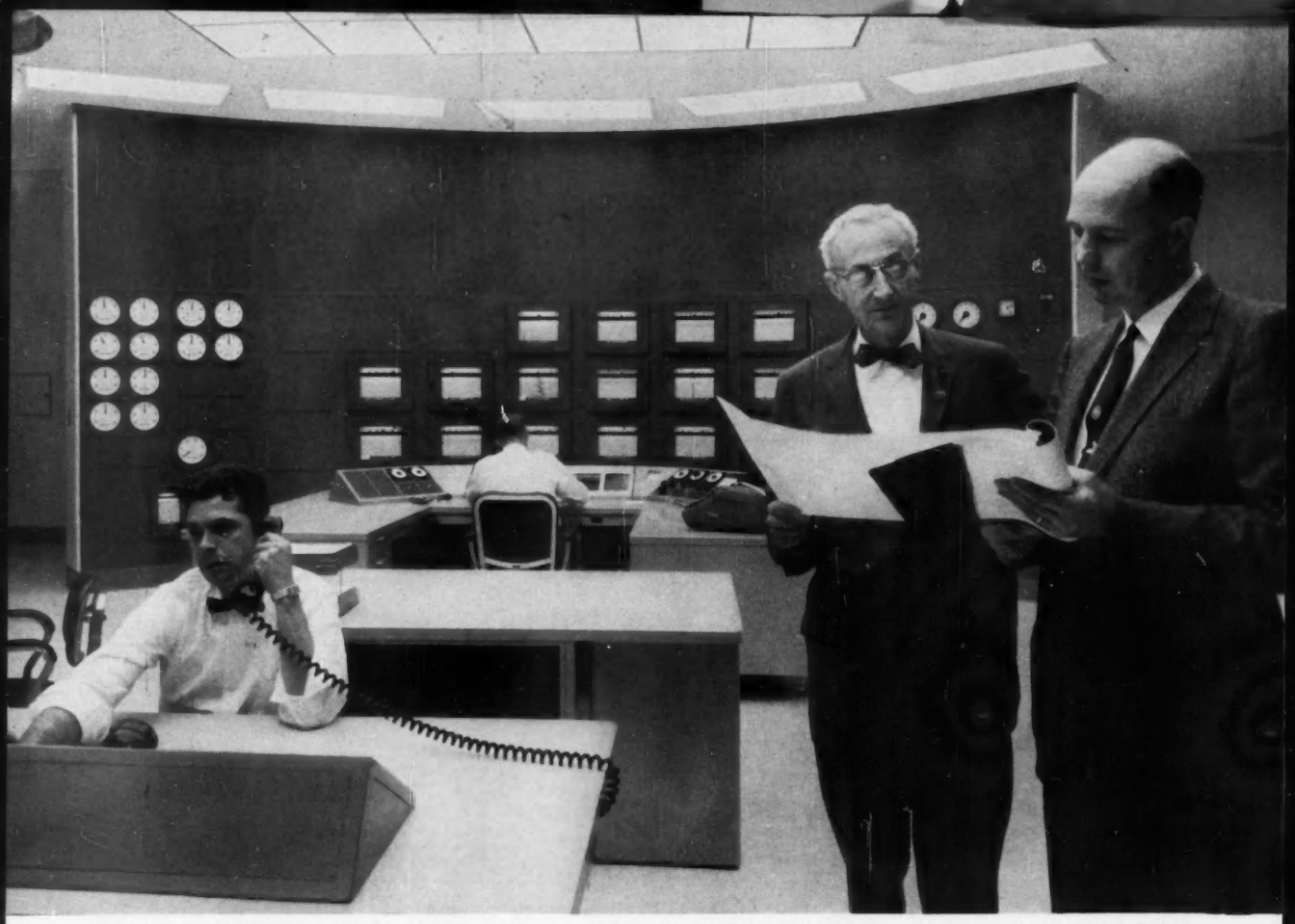


REDUCED FUEL EXPENSE is expected by Connecticut Valley Power Exchange through application of G-E automatic load dispatching system. D. Z. Stremlau (left, standing), Exchange Manager, and J. D. C. Guy, G-E Sales Engineer, discuss operation of dispatching center at North Bloomfield, Conn.

Automatic dispatching system for pool operation . . .

Connecticut Valley Power Exchange to effect economies with General Electric load dispatching system

Two Eastern electric utilities—Hartford Electric Light Co., and Western Massachusetts Electric Co.—recently began controlling power generation for their interconnected service areas with a General Electric automatic dispatching system. This is the first time a power pool has been able to perform automatically both controlling and computing functions for load dispatching.

POINTS WAY TO SAVINGS

The electric utility industry has made consistent progress in reducing operating expenses, and this application points the way to another source of further savings to help offset the continuing rise in the cost of material and labor. It also provides the clearest demonstration of General Electric's leadership in designing and applying automatic dispatching systems since the Company installed the first fully automatic system in 1956.

HOW POOL OPERATES

Eight generating units will be controlled from the Exchange dispatching center in North Bloomfield, Conn. Here the General Electric dispatching equipment continually analyzes the capacity and efficiency of turbines and boilers and the changes in system load. This information, modified by transmission loss penalty factors, is immediately converted into operating signals which are continuously sent to each generating unit. Thus the system operates at optimum efficiency for every load condition.

ENGINEERING ASSISTANCE

General Electric application specialists, working closely with engineers from the two utilities, tailored the dispatching system to the individual needs of the Exchange's service area. The system was designed to require a minimum of attention from dispatchers and station operators, and the need for detailed loading schedules was eliminated.

For more information on how your utility can achieve greater operating economies through automatic dispatching, contact your General Electric Apparatus Sales Office or write for bulletin GER-1180 to General Electric Co., Section 301-347, Schenectady 5, N. Y.

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

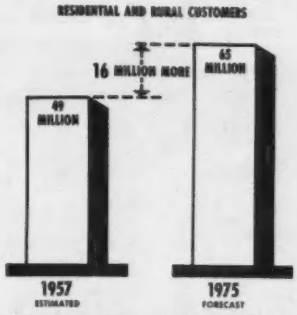
GENERAL ELECTRIC

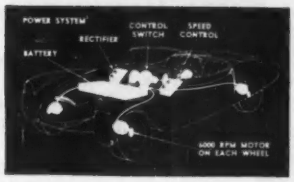
Electrical World

Vol. 149, No. 10 MARCH 10, 1958

Published for 84 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue





CURRENT EVENTS

PG&E Atomic Plant to be Competitive

60-Mw nuclear unit to serve remote load in high-cost fuel areas. Eight mills per kwhr is predicted.....p 40

MANAGEMENT

What Will Power Systems Be Like in 1975?

Panel of Ebasco experts foresee capability at 410 million kw, higher voltage transmission and distribution.....p 52

NUCLEAR POWER

Shippingport Opens Door to Atomic Power

Here's photographic tour of the first commercial-scale nuclear power plant in the United States.....p 54

Nuclear Plant to Operate Conventionally

The 100-Mw pressurized water reactor at Shippingport is designed to accept share of system load swings.....p 56

RELAYING AND PROTECTION

Microwave Gives Transformer Protection

E. A. Cockey, Baltimore Gas & Electric Co

Baltimore G&E installs and extends transfer tripping scheme that employs two tones for reliability.....p 49

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12kv giant goes under. San Diego Gas & Electric installed this 3,900-foot submarine cable across San Diego Bay in a fast and trouble-free operation. The new 12kv, 3/c, 500,000 CM cable is 4½ inches in diameter with Okolite rubber insulation, copper shielding tapes and steel armor.

Cable laying time: **half an hour flat!**

Okolite used for pre-tested dependability

The problem was to obtain maximum dependability in the new submarine cable laid under San Diego Bay to handle increased power needs in the busy Coronado area. In submarine cable, of course, dependability is doubly important with the rough service cable gets and the complicated and expensive operation required to lay a cable or remove it in case of trouble.

To insure this dependability, engineers from San Diego Gas and Electric chose pre-tested Okolite-insulated cable . . . and took advantage of three sound standards for evaluating anticipated cable service:

1. Time—High-voltage Okolite-insulated cables have a service record of more than 30 years . . . on land as well as in tough, underwater services, where a case of trouble can run into thousands of dollars.

2. Engineering—Okonite engineers' know-how pays off in every stage of cable purchase and installation: from designing the best construction possible to speeding installation, as in San Diego's case, with Okonite-designed reel frames, lifting beams and other cable-handling equipment.

3. Inch-by-Inch Inspection—Okonite now provides built-in life insurance for every strip-insulated, high-voltage cable through the use of its exclusive development, the "Gooding Test Train." This electronic testing equipment, which scans every inch of the cable, can pick out the most minute imperfection—impossible to detect by any standard test method—that might shorten cable life after it's placed in service.

These are three good reasons for *you* to specify Okolite for *your* vital high-voltage circuits. Whatever your cable needs, when you talk to Okonite, you get unprejudiced recommendations because Okonite, and *only* Okonite, makes cable by all four insulating methods: strip . . . dip . . . extrusion . . . taping. The Okonite Company, Passaic, New Jersey.

where there's electrical power . . . there's **OKONITE CABLE**

5479

REA Bulletin 142-1—Electric House Heating

"From the engineering angle this load should not be thought of as the last and only large load the consumer will utilize. It should not be viewed with alarm as something to be avoided, hedged against, or controlled. Rather, the engineering viewpoint is to accept this new load, encourage its development, and seek to make the best use of it in the furtherance of a well balanced system."

This is just a sample of the kind of sensible approach to electric house heating which this REA Bulletin contains (see E.W. 1/6/58 p 68). It is a well organized booklet which we suspect will stimulate considerable action.

Now according to our data, some 85% of co-op power is purchased. About 40% is purchased from power companies.

It would appear, therefore, that before long some utilities who do not promote or even accept electric house heating may be picking up the load by way of their co-op customer. Perhaps now is the time for companies and co-ops to get together on this little problem.

Fischer Black

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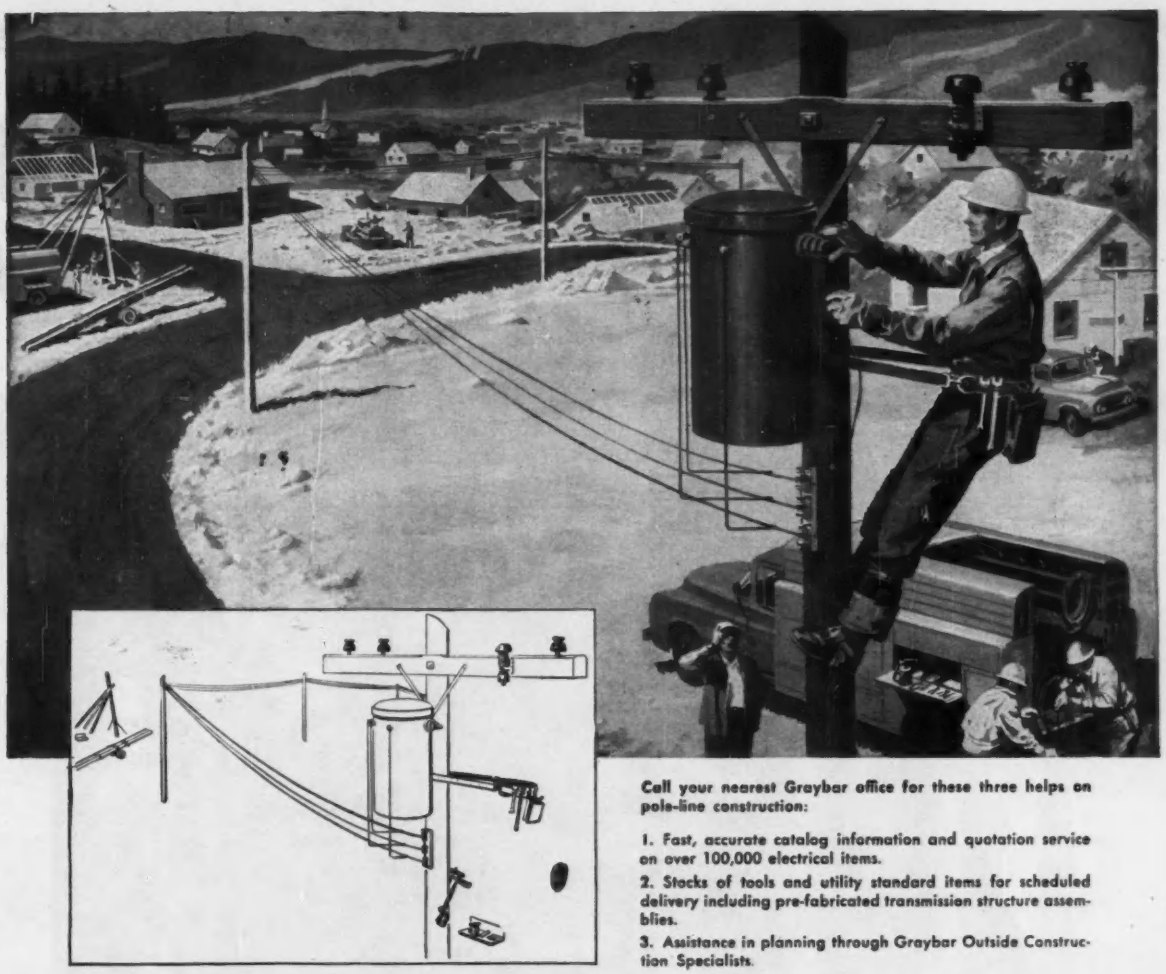

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1. Fast, accurate catalog information and quotation service on over 100,000 electrical items.
2. Stocks of tools and utility standard items for scheduled delivery including pre-fabricated transmission structure assemblies.
3. Assistance in planning through Graybar Outside Construction Specialists.

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Another example of Allis-Chalmers

Idea-

for simplified

Ratings: 14.4 kv through 69 kv, 500 mva through 3500 mva

Pneu-Draulic and Turbo Rupter are Allis-Chalmers trademarks.

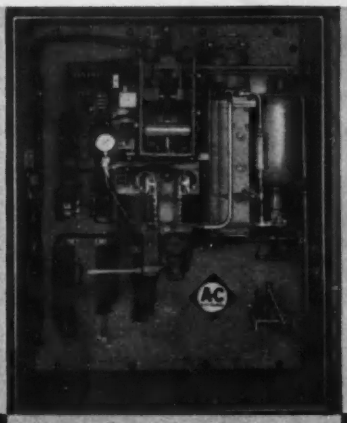
ALLIS-CHALMERS

leadership in circuit breakers

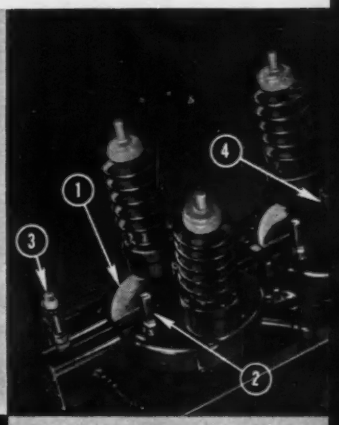
packed design

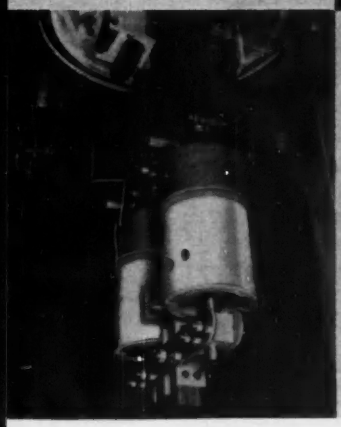
operation and maintenance

Few moving parts, fast action, freedom from problems of moisture, dust and dirt have resulted in reliability and wide acceptance of *Pneu-Draulic* operator.

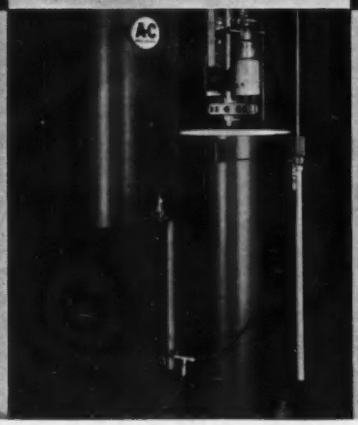


(1) Self-cleaning, smooth, fabricated steel top for each tank; (2) high visibility float-type oil gauge and (3) position indicator; (4) external adjustment of overtravel stop (without using feeler gauges).





Positive contact — without contact bounce — is inherent in the *Turbo Ruptor* device with its tulip and bayonet-type contacts.



Time for raising and lowering tanks reduced 80% with power-operated hydraulic tank lifter — very little effort required. A 115/230-volt ac portable unit also available.

Pictures tell story of features of Allis-Chalmers large frame-type breakers

A-C ALLIS-CHALMERS

A-3675

CAREFUL engineering planning has resulted in today's top breaker value. There are big features: *Pneu-Draulic* operator; optional, power-operated hydraulic tank lifter; and tulip and bayonet-type *Turbo Ruptor* interrupting device.

. . . and still more features: side trip; ball-type position indicator visible from greater distance; wide, shallow and easily accessible operator cabinet; leak-free, float-type oil gauge; single lift-rod guide (instead of two) for accessibility; and many more.

These breakers are mechanically trip-free, as are all Allis-Chalmers breakers. They have AEIC standard wiring plus ASA standardized bushings.

For details, contact your nearby A-C office or write for Bulletin 71B8475. Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Here are the **NEW GUYS** they're all talking about!

Men who are using the new Copperweld* Type M Guy Strand are already praising its two major features: Economy and Convenience. Through research and new production techniques, it is possible to market Type M at new low prices, yet retain the high quality standards of Copperweld. Consequently, your initial investment is minimized. As for yearly maintenance, it is a long-established fact that there is practically no upkeep with Copperweld.

Pliable and easy to handle, Type M Guy Strand can be readily bent, served, moused or clamped. The thick, ductile copper sheath of each wire will not crack, flake or peel because it is inseparably molten-welded to the steel core.

Write us today for complete details. Our field engineers will be glad to explain the advantages of Type M to you.

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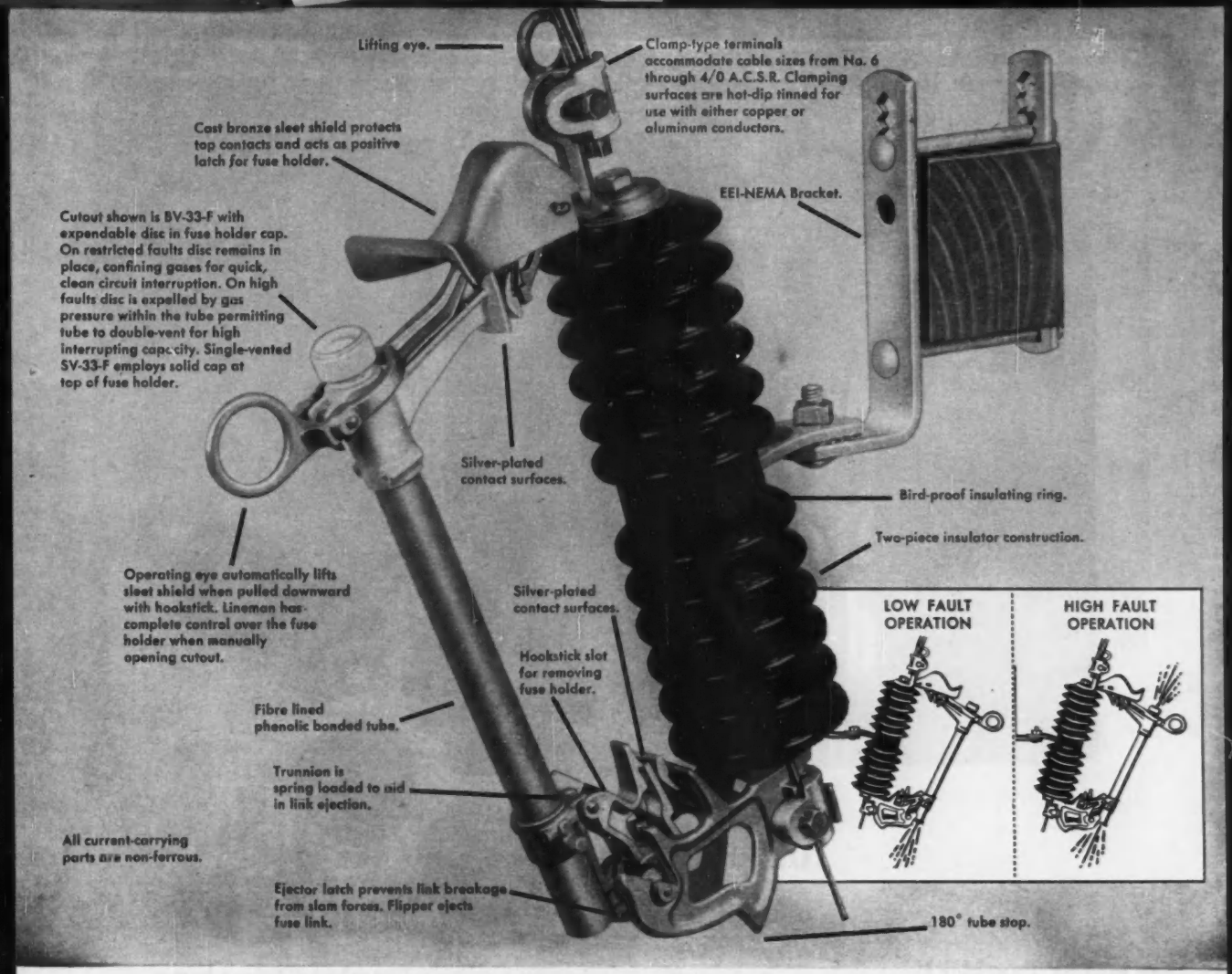
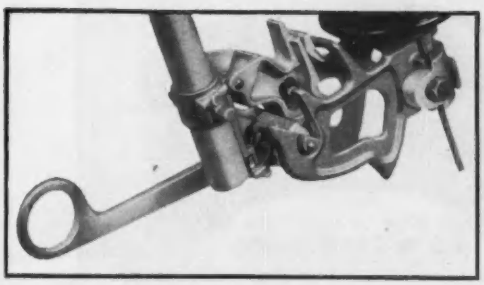
TYPE M GUY STRAND

2.2M 4M 6M 8M 10M 12.5M 16M


Lifting eye.
Clamp-type terminals accommodate cable sizes from No. 6 through 4/0 A.C.S.R. Clamping surfaces are hot-dip tinned for use with either copper or aluminum conductors.
Cast bronze sleet shield protects top contacts and acts as positive latch for fuse holder.
EEI-NEMA Bracket.
Cutout shown is BV-33-F with expendable disc in fuse holder cap. On restricted faults disc remains in place, confining gases for quick, clean circuit interruption. On high faults disc is expelled by gas pressure within the tube permitting tube to double-vent for high interrupting capacity. Single-vented SV-33-F employs solid cap at top of fuse holder.
Silver-plated contact surfaces.
Bird-proof insulating ring.
Two-piece insulator construction.
Operating eye automatically lifts sleet shield when pulled downward with hookstick. Lineman has complete control over the fuse holder when manually opening cutout.
Silver-plated contact surfaces.
Hookstick slot for removing fuse holder.
Fibre lined phenolic bonded tube.
Trunnion is spring loaded to aid in link ejection.
All current-carrying parts are non-ferrous.
Ejector latch prevents link breakage from slam forces. Flipper ejects fuse link.
180° tube stop.
LOW FAULT OPERATION
HIGH FAULT OPERATION

Southern States new cutout offers double action for double protection



THE LBV-33-F LOAD BREAK CUTOUT

Has all the features of the BV-33-F, including the expendable disc. It is equipped with a load break mechanism which permits it to serve as a load break switch. It is designed for use with universal button head links only in ratings as high as 100 amperes.

Type BV-33-F—5.2, 7.8, 15, 25 kv—100, 200 amps

THE POWERFUL NEW BV-33-F CUTOUT automatically provides protection against restricted as well as heavy faults.

An expendable disc in the fuse holder cap does the trick! On low faults it remains intact, restricting gases within the tube for maximum arc-quenching ability. On high faults the disc blows out, permitting the cutout to double-vent for maximum interrupting capacity.

Compare the features of the BV-33-F with any other cutout. Add to them the double protection it offers, and you have the answer to your cutout requirements.

For complete details, see your local Southern States representative, or write direct for Bulletin 570-C.

LIVE BETTER ELECTRICALLY

IN CANADA: Dominion Cutout Co., Ltd., Toronto

SOUTHERN STATES
EQUIPMENT CORP.
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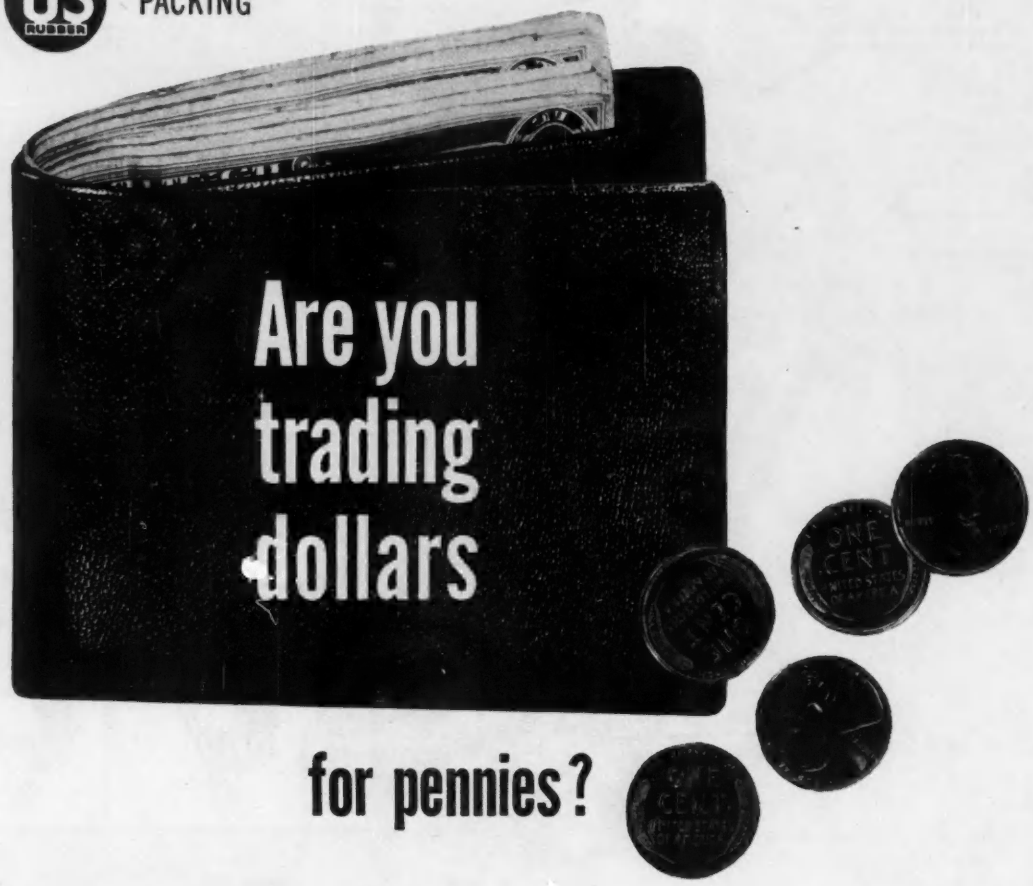
US RUBBER PACKING



You may be. Consider this: How much does it cost you every time you shut down a production line to replace the packing in just one piece of hydraulic equipment? Now, multiply this by the amount of times this same equipment has had to be re-packed, say, in the past three years. And multiply this figure by the total amount of hydraulic equipment in your production system.

This downtime cost is enormous—just for packing. It's far higher than the cost of the packing itself ... and a lot more than the pennies saved by buying less expensive, inferior packing.

It's for this reason that packing like U.S. Matchless® is, by far, your most economical buy. It's made in a variety of styles, each for specific applications. Used and recommended by many of the leading original equipment manufacturers, Matchless is a packing you can trust to do the job longer, better... to turn downtime losses into uptime profits.

U.S. Matchless is part of a complete line of quality packings available at your "U.S." Distributor, or write us at Rockefeller Center, N. Y. 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

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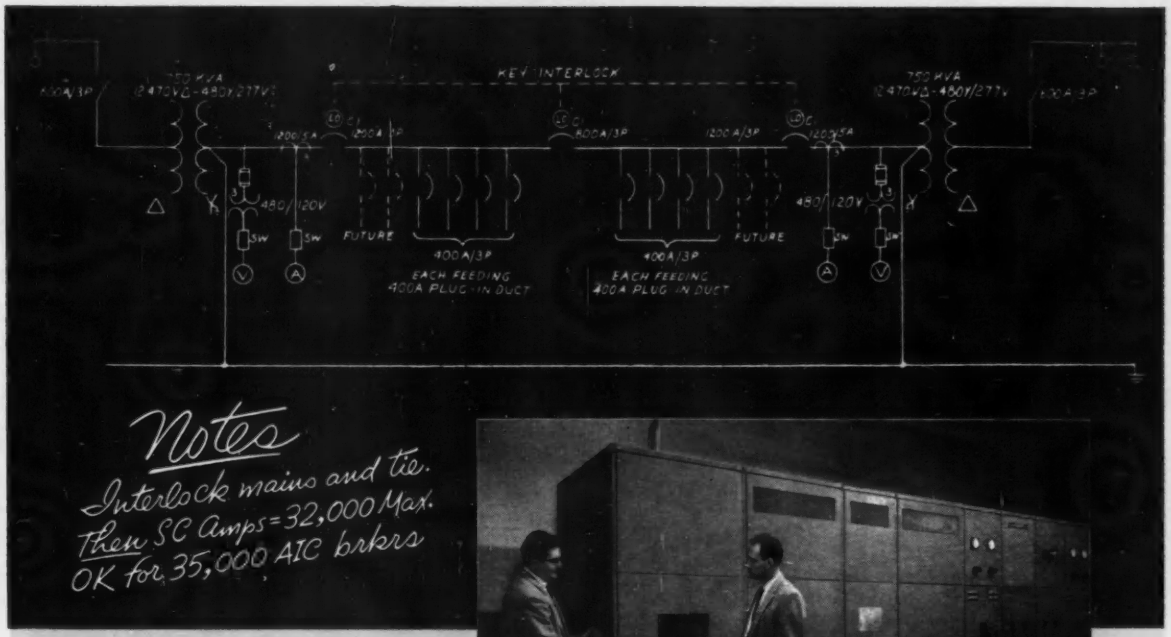
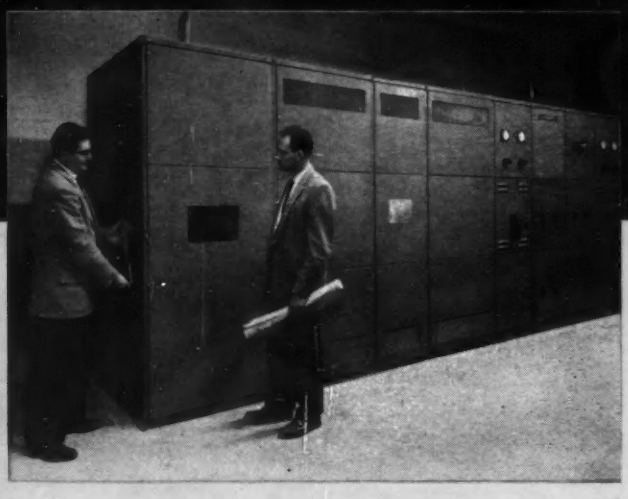


Notes
Interlock mains and tie.
Then SC Amps = 32,000 Max.
OK for 35,000 AIC brkrs



In Unit Substations COORDINATED DESIGN

Cuts Costs and Saves Space!

Square D designs and builds a complete line of substations for any application, indoor or outdoor—with dry or liquid-filled transformers—with large air breakers or molded case breakers—with motor control units.

A typical example is this 1500 KVA double-ended unit substation, designed to meet the special requirements of a Lexington, Kentucky, plant. Flexibility for future expansion and complete safety without service interruption were essential. The following features are incorporated in the unit:

Main breakers are 1200-ampere air circuit breakers

Feeder breakers used to feed Square D plug-in duct, are molded case breakers

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By the proper application of molded case breakers, Square D engineers achieved a substantial reduction in both the size and the cost of the substation—and with no sacrifice in performance.

For the complete story of Square D coordinated design, write Square D Company, 6060 Rivard Street, Department SA, Detroit 11, Michigan.

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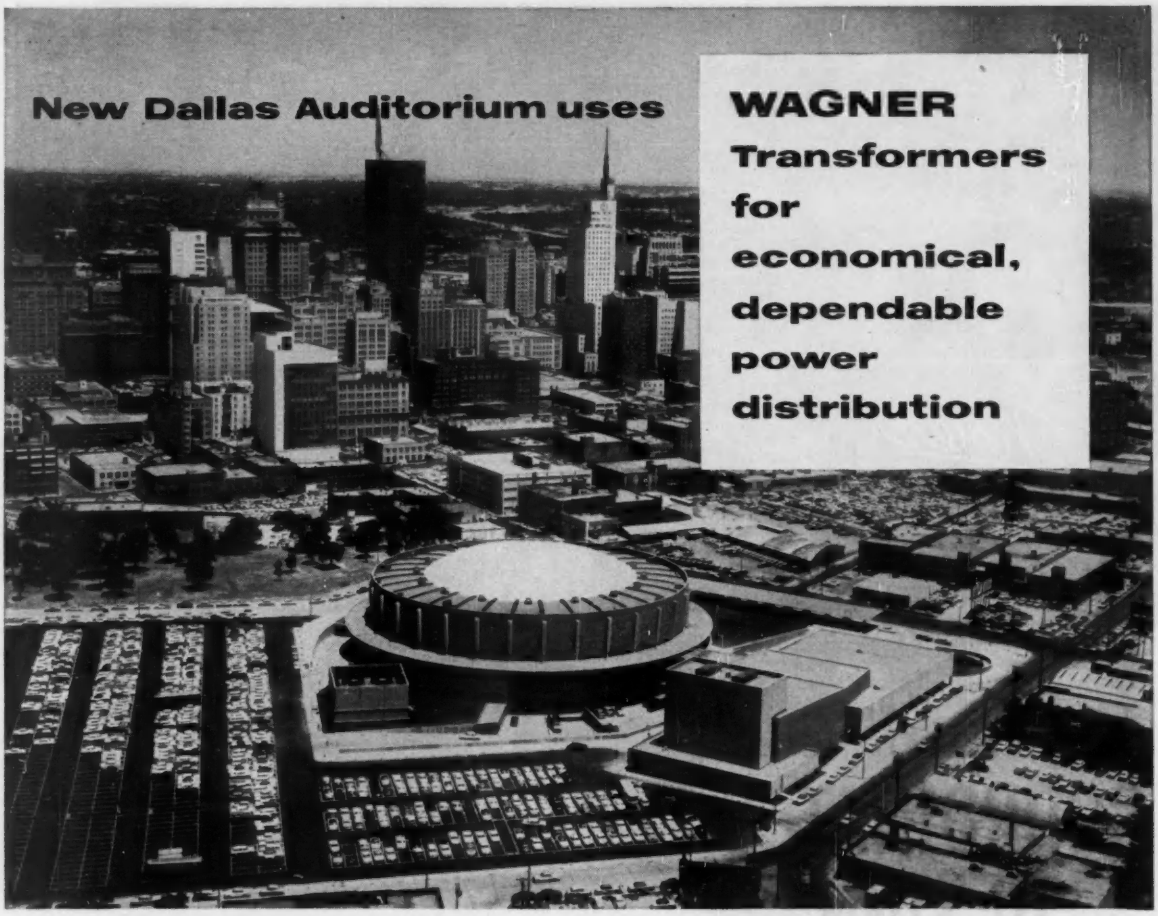
SQUARE D COMPANY



The mammoth, saucer shaped Dallas Memorial Auditorium, with its 300 foot diameter circular stadium, is a tremendous consumer of electric power. Its total connected load for power and lighting is 3250 kva. That's enough electricity to supply the power needs of 1200 modern homes!

This electric power is distributed efficiently and economically by 21 Wagner Dry Type Transformers. These transformers put the correct voltage right where it is needed—close to the load. Such installations are extremely economical because they eliminate long runs of wiring and reduce line losses in the distribution system. They meet all safety requirements for indoor installation.

Wagner Dry-Type Transformers can answer your power distribution needs just as they do at the Dallas Auditorium. Call your nearby Wagner Sales Engineer and have him tell you how these transformers can modernize your power distribution system. Bulletin TU-57 gives full information if you prefer to write.

A 300 kva Wagner Dry-Type Transformer in the Dallas Auditorium . . . one of 21 of these units, ranging from 25 through 300 kva, that provide a total capacity of some 2400 kva.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

WTSB-7

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Sky-Master gets to out-of-the-way places that can't be reached with conventional aerial equipment . . . saves time . . . saves manpower . . . often eliminates the need for rigging required on many overhead jobs.

With Sky-Master, it's unnecessary to "ground" an experienced man just because his climbing days are over. He can step into Sky-Master's insulated work basket, move the controls, and reach overhead work faster and safer than ever. When controls are released, Sky-Master stops right there—stays right there—until it's purposely moved. Can't creep even if hydraulic lines are damaged.

Sky-Master versatility is yours in one- and two-man models . . . in sizes for reaching from 42′ to 48′ above ground.

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UTILITY BODIES AND EQUIPMENT

McCABE-POWERS
BODY COMPANY

5900 NO. BROADWAY
ST. LOUIS 15, MO.

625 CEDAR STREET
BERKELEY 10, CALIF.

There IS a Difference!

Connectors may look alike
but it's PERFORMANCE that counts

BLACKBURN CONNECTORS OUT-PERFORM THEM ALL

Because They Are...

BETTER MECHANICALLY

- Made of high strength duronze, a silicon bronze alloy stronger than structural steel.
- Machine cut threads, *CFC treated, provides more thread engagement —reduces friction and increases thread efficiency. *Chemical Friction Control.
- Rigid inspection of each production operation assures uniformly good connectors.

BETTER ELECTRICALLY

- High clamping force—the result of greater thread efficiency breaks down oxide on the conductor improving conductivity.
- Higher initial conductivity, actually greater than an equal length of conductor is maintained permanently.

REUSABLE

- Selection of proper high-strength, corrosion-resistant materials—plus precision workmanship and inspection—means Blackburn connectors may be used over and over.

BLACKBURN *Hi-Strength* CONNECTORS

AVAILABLE AT ELECTRICAL WHOLESALERS EVERYWHERE

JASPER BLACKBURN CORP., 1525 Woodson Rd., St. Louis 14, Mo., WYdown 3-9430

This wooden pole had a normal life expectancy of 25 years—grass fire reduced it to less than five. Even where one fire doesn't make a pole a total loss, pole life is substantially shortened. One application of economical, easy-to-use "Telvar" would have prevented this costly and unnecessary damage.

Kill fire-hazardous vegetation all season long— spray just once with Du Pont "TELVAR"

Chemical pole scalping with "Telvar" eliminates fire-hazardous vegetation and offers a considerable saving over expensive hand-scalping methods.

"Telvar" kills vegetation through the roots and prevents regrowth because the chemical remains in the soil to provide residual action all season long. Low dosages (1 to 1½ lbs. per 1,000 sq. ft.) make it cost little for the results obtained. Such low rates also cut storage and handling costs.

"Telvar" weed killers come as wettable powders, are non-corrosive, non-flammable, non-volatile, low in toxicity to humans and livestock. Wherever vegetation creates a fire hazard or makes maintenance difficult, such as pole yards, storage areas and substations, use Du Pont "Telvar." Write Du Pont, Grasselli Chemicals Department, Room D-4032, Wilmington 98, Delaware, for illustrative booklets on "Telvar" for long-term, low-cost weed control.

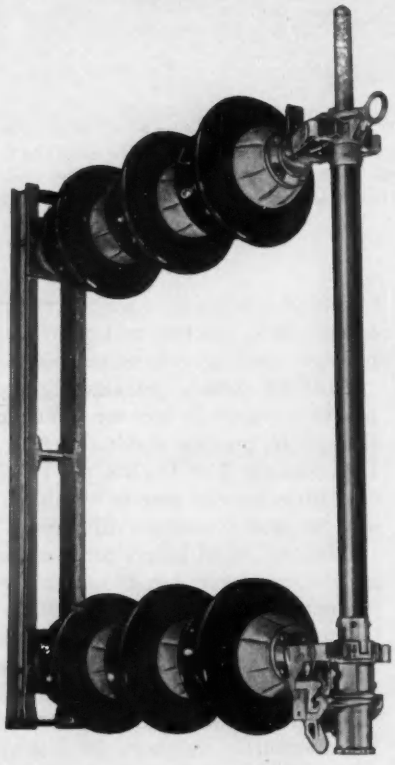
On all chemicals always follow label instructions and warnings carefully

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

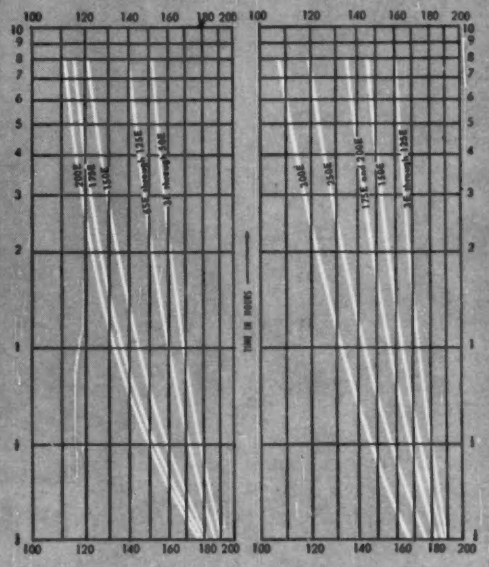
TELVAR®

MONURON AND DIURON WEED KILLERS

now...
even for overloads
you can match
power fuses to power
transformers



short-time emergency overload capability for SMD Power Fuses



Load Current in Per Cent of SMD-1 Fuse Unit Ampere Rating

Load Current in Per Cent of SMD-2 Fuse Unit Ampere Rating

The pressure is on to obtain maximum utilization of power transformer capacity. This pressure has led to precise evaluation of transformer short-time overload capabilities—for both daily peaks and occasional emergencies.

To keep pace, S&C has made correspondingly precise evaluations of the overload capabilities of its power fuses.

The result: (1) New fusing tables (minimum ampere rating recommendation) which recognize short-time daily overload and (2) new curves (see above) which permit you to subject power fuses to extreme short-time overload during emergencies, as when one transformer picks up the load of another.

All of this is part of a new method for power fuse selection contained in a 16-page package—Data Bulletin 262. For your copy, write to S&C Electric Company, 4421 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

S&C ELECTRIC COMPANY

The Electrical Newsletter

FUTURE NEWS ▶ **Argentina (SA) Water & Power Board is developing design** of a 628-mi, 380-Kv transmission line of 500-Mw capacity from El Chocon to Buenos Aires. The line is described as the longest in the world.

Rep James E. Van Zandt (R-Pa.) may be a candidate for the Senate or AEC in near future. Washington sources say if the ranking Republican on Joint Committee on Atomic Energy is defeated as a candidate for Senator, he'll get Administration's nod as AEC member.

Dimensional standards for apparatus bushings for use on outdoor circuit breakers and power transformers above 69 Kv (ASA C 76.1a-1958) will be published by American Standards Assn this month.

Formula by which U. S. could help develop one-million kw nuclear power within five years in six western European nations will be sought this month by American and European atomic officials.

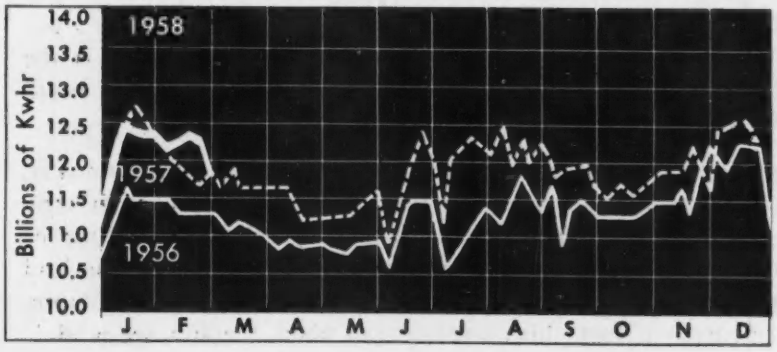
LATE NEWS ▶ **Court of Chancery held that Delaware P&L does not have to pay a** ½-mill-per-kwhr "franchise fee" imposed recently by city of Newark, Del. Franchise had been granted previously, and city council had reserved no right to amend it.

Rockland L&P and Orange and Rockland Electric have formally merged into Orange and Rockland Utilities, Inc.

Monongehela Power and UWUA agree to 4% wage increase for 106 employees in one generating plant . . . Consolidated Edison employees who are UWUA members ratify labor contract by a 10,135 to 7,793 vote (EW, 2/24, p 19) . . . Dallas P&L union employees ask for 7½% wage hike . . . IBEW workers in British Columbia Electric Co's plant and construction projects strike on wages.

Management changes . . . Long Island Lighting ups E. C. Duffy and H. B. Wakeman to senior VP's; William Welch, Jr, to VP-engineering.

Power Output—Up 0.1% (Week ending Mar. 1), Kwhr 11,803,000,000



Per Cent Change From Previous Year

	Feb. 15	Feb. 22	Mar. 1
Total U.S.	+3.9	+3.5	+0.1
New Eng.	+2.4	+5.5	+2.2
Mid. Atlan.	+3.1	+2.5	+0.1
Cent. Ind.	+0.6	+0.3	−3.1
West Cent.	+7.3	+6.0	+0.8
Southeast	+8.4	+8.2	+0.5
South Cent.	+3.6	+4.2	+2.0
Rocky Mount.	+0.8	−1.1	+6.0
Pacific			
NW	+4.8	+1.3	+2.3
SW	+3.7	+3.0	+2.0

Seasonally Adjusted Index 229.0

Week ago 234.8 Year Ago 228.0

Atomic Energy Commission requirements—1,050,000,000 Kwhr (Electrical World estimate). Excluding AEC, output increase was 1.1%.

ATOMIC PROGRESS ▶ **Pacific G&E's proposed reactor will be first in U.S. to compete with** fossil fuels on a cost basis. The 60-Mw, privately financed facility, going up in a high-cost fuel area, will generate energy at eight mills per kwhr (p 40).

Electric utilities are investing heavily to speed economical A-power in the U. S. But because today's program is adequate only for domestic needs, more federal help may be needed to hold our leadership in A-power development abroad. This was the opinion of industry spokesmen now testifying at Joint Committee on Atomic Energy's hearings into progress of the civilian atomic industry (p 40).

EVENTS ▶ **Soon you may be able to "Drive Better . . . Electrically."** The electric auto, forgotten for the past 50 years, may soon appear on the highways in a sleek, safe, and economical version. A Fort Lauderdale engineer describes the electric autos' many advantages on p 42.

Utilities are giving promising students a lift via scholarships and assistance programs to colleges and deserving employees (p 44).

MANAGEMENT ▶ **In 1975's "truly electric age", we'll have 410-million kw capability** and should be generating about 1,850 billion kwhr a year. This bright prediction, coming from a panel at the recent Clients' Conference of Ebasco Services, means U. S. utilities will have an annual growth rate of about 6%. Wonder items contributing to increased use of electricity include electronic ranges, electroluminescent walls, and assembly-line food preparation (p 52).

Should you teach meter readers about atomic energy? Is there any point to having young engineers learn about rate making? More and more electric companies are answering "Yes" to these questions and broad employee training programs are becoming more numerous. Here's a rundown on some employee training programs which your company may want to use—EEI's economics course, the Public Utilities Reports Guides to the utility business, PIP's "The Atom in our Business" (p 101).

GENERATION ▶ **You can get a close look at the Shippingport atomic power project** and the key steps which led to its successful operation in EW's picture story on p 54. The 100Mw (60 Mw initially) plant is the world's first full-scale atomic electric station serving civilian needs exclusively.

Shippingport's pressurized water reactor will run conventionally, despite its unconventional heat source. Because of an inherent negative temperature coefficient which aids the station in accepting its share of load swings, output will follow all but the largest load changes without immediate control-rod movement. For a comprehensive study of how this nuclear power plant operates, see p 56.

TRANSMISSION ▶ **Texas co-op wins its battle against insulator arcing and flashovers** by fitting plastic shields around insulators to keep them clean. Previously, arcing from salt spray and dirt had cost Nueces Electric Co-op $29,000 in one year in burned pole tops alone (p 61).

RELAYING ▶ **To insure high-speed protection for transformers, use microwave** for transfer tripping, recommends Baltimore G&E. The company, now using the system successfully, claims the new scheme protects long, high-voltage circuits and also serves as back-up relaying when a breaker doesn't work. Two tones are used for reliability (p 49).

INDUSTRIAL ▶ **Electric strip heaters pay off in economical week-end heating** for an Ohio packing firm. It finds cost of running the electric units is much less than cost of coal and fireman's labor when boilers remained in operation. Another benefit: accurate temperature and humidity control (p 76).

SELLING ▶ **Why did General Electric abandon the "fair trade" policy** it had fought so long and so hard to maintain? Does this move mean it has abandoned the fair trade principle altogether? For the answers to these and other questions about the long-standing fair-trade vs free-trade controversy, see p 72.

MANUFACTURERS ▶ **Condenser weighing 500 tons is shipped in 13 sections** to Jersey Central P&L station. When installed, it will support a Westinghouse 137.5 Mw turbine-generator . . . GE announces its 1-60 Class 200 meter has been certified for accuracy and performance, and that dry-type transformers are found to have sound levels of 45 decibels or below . . . Allis-Chalmers will build a 111,500-hp hydroturbine for Alabama Power's proposed Lewis Smith Dam (p 98).

NEW EQUIPMENT ▶ **New on the market is a hydraulically-operated aerial elbow** with direct-acting aircraft type control cables which simplify operation and reduce maintenance . . . A post-type insulator just introduced is economical for 1,500-lb cantilever loading (p 85) . . . Feature of two new hot line clamps is large area high pressure main and tap contacts. Clamps come in open and enclosed thread models . . . Circuit protective device now available has high interrupting capacity, becomes circuit limiting at about four times normal rating (p 86).

PEOPLE ▶ **Duquesne Light ups W. A. Conwell** to VP-Engineering and Construction Division . . . At Iowa Southern Utilities, F. M. Jennings becomes manager of engineering and construction . . . Burton Schellenbach is new VP-sales for H. K. Porter (p 107) . . . Kuhlman Electric names P. M. Green, Jr, as general sales manager, Transformer Division . . . C. W. Sanford assumes duties as VP-manufacturing for Crouse-Hinds (p 108).

Supplementary regulators are economic for maintenance of voltage on long 4-kv distribution circuits. Even though fixed and switched capacitors are applied to boost circuit pf to 100%, at least one set of supplementary regulators is often justifiable even in the original design of main feeders.—**M. W. Gangel and I. C. H. Campbell, Distribution, Jan 1958.**

Proposed higher loan rates to REA's means 'slow starvation'. If Congress should go along with this "weaken 'em for easy pickin'" administration proposal, the following would result almost immediately: Inadequate loan funds; higher interest rates; higher electric rates to farmers and other rural customers; power shortages.—**C. T. Ellis, Rural Electrification Magazine, Feb 1958.**

TECHNICAL NOTES

Using a vaned elbow under the pump bell of a circulating water pump allows use of a discharge chamber only a few inches wider than the pump bell itself. The elbow consists of a set of five to eight horizontal turning vanes made of carbon steel. Although the vanes permit a narrower chamber, their use makes a deeper chamber necessary.

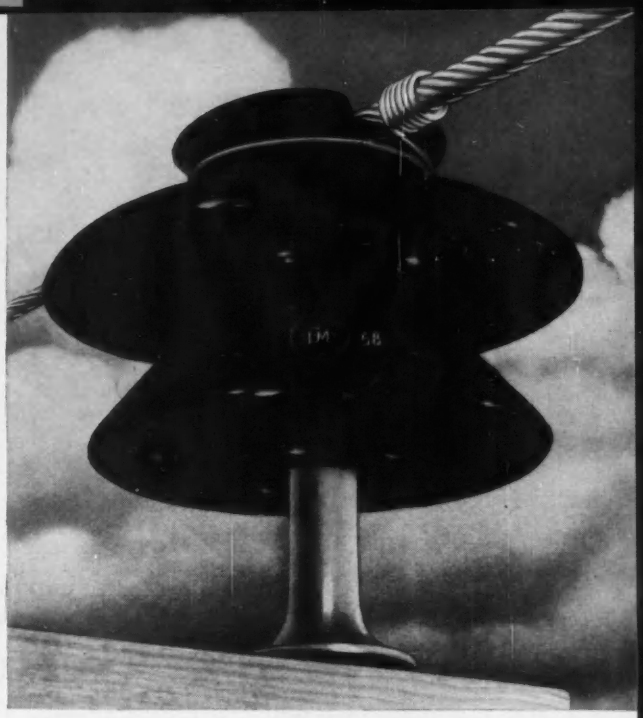
Arranging overhauling schedules on the constant risk principle provides essentially the same amount of capacity to take care of forced outages on any monthly peak day throughout the year. Relating reserve to only maximum demand of year results in excess reserve during most of the year.

Side-dumping coal car is claimed to unload coal faster. The floor of the car is hinged in the middle and can be raised by hydraulic jacks to discharge coal from the sides of the car. Car was designed in Hungary.

FROM EDITORS IN THE FIELD

An inflated neoprene-coated nylon balloon was used as a temporary plug for a 30-in. circulating discharge line at the South Carolina Electric & Gas Co's Hagood plant. The balloon method was used, when discharge piping changes were necessary, rather than the more conventional method of blocking and draining the intake tunnels. The conventional method would have meant shutting down the entire plant rather than just the one unit requiring modifications.

L-M HIGH-VOLTAGE, 10-inch suspension insulator has many outstanding features, including high-grade malleable or forged caps, and forged steel, "Cor-Ten", or stainless steel pins.



L-M HIGH-VOLTAGE pin-type insulators are available with radio and TV noise-proof glaze in standard production. Skirts are designed to provide good self-washing action.

Now It's "L-M Porcelain"

With new standards of material testing, manufacturing controls, and rigid final tests, Illinois Edison Porcelain products are now being shipped under the name of Line Material Electrical Porcelain Insulators.

For five years Illinois Edison Porcelain has been under Line Material operation. During this time, L-M has made extensive changes in production procedure, quality control and final testing to insure uniformity, consistently high strength, and insulating value in the product.

The porcelain insulators shipped from this plant are now marked with the L-M trademark. They are the highest quality available in the industry today.

Extensive Control and Testing

A completely new ceramic laboratory has been built for testing raw material and production methods. New, accurately controlled molding, pressing, drying, and glazing equipment has been installed to assure maximum uniform density and strength in the porcelain. A new, completely automatic kiln is now in production. Facilities also include a modern galvanizing plant for maximum processing control of the associated insulator hardware. With the most modern plant in the industry, L-M aims to supply the highest quality.

Meet EEI-NEMA Standards—With Plenty To Spare

Line Material porcelain includes pin and suspension insulators, strain insulators, switch and bus insulators. All meet EEI-NEMA standards with an ample margin.

Get Complete Information

Ask your L-M Field Engineer for complete information, and a copy of informative Bulletin DL8; or write Line Material Industries, Milwaukee 1, Wisconsin.

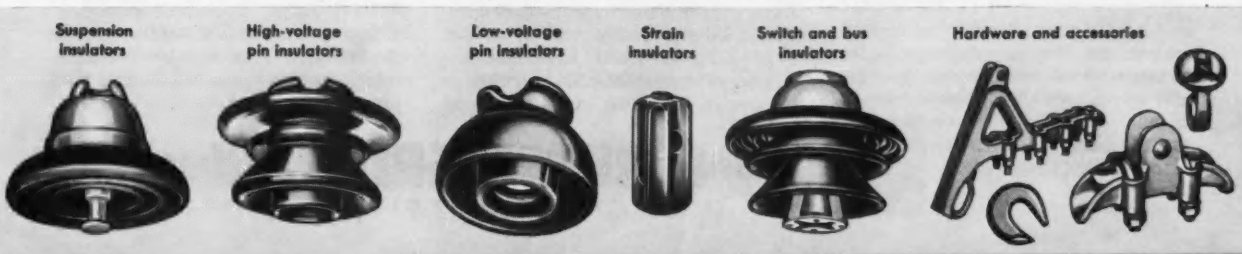
LINE MATERIAL Industries
McGRAW-EDISON COMPANY

McGRAW EDISON

330

Electrical Porcelain Insulators

L-M offers an extensive line of suspension and strain insulators, and hardware accessories



L-M's "HDO" open-type cutouts provide greater system reliability. The bird-proof design, rugged construction, and high interrupting capacity built into the cutout assure long, trouble-free service.

How L-M "HDO" Open-Type Cutouts Handle Both High and Low Faults

L-M's controlled double-venting principle provides positive pressure control—an outstanding advance in fuse cutout design.

by **M. L. FENNIG**
Sales Application Engineer,
Protective Equipment,
Line Material Industries

Fuse cutout design has always been something of a compromise. To assure expulsion of arcs from low-amperage faults, the tube must provide small volume to build ample pressure. Yet this same tube is subject to sudden rupture from the rapid development of large gas volumes from high-amperage arcs. L-M's controlled double-venting principle provides the best solution to this problem known at the present time.

Positive Pressure Control

A unique feature of L-M's "HDO" cutout is the pressure-controlled double-venting cap. On low-amperage faults, gases are vented from the bottom of the tube only. This allows sufficient pressure to build up in the tube to assure consistent, reliable arc interruption of faults of the smallest magnitude.

On high-amperage faults, where pressure relief is needed, the diaphragm in the heavy-duty cap opens at the top to allow double venting. The double venting reduces the stress on the cutout, eliminating the possibility of bursting the tube on high-amperage faults. This assures dependable operation, and greater safety for the lineman. Gases from the top are vented vertically to avoid gases from the bottom. This minimizes possibility of contact flashover.

L-M's "HDO" cutouts are strong, durable and easy to operate. They provide the greatest system reliability and lowest operating and maintenance cost of any cutout on the market today. Here's why.

Lower Resistance Path

All current-carrying parts are made of heavy-duty solid copper or copper alloy and are silver-plated to assure cool operation even after many years of service. In addition, the "HDO" has a minimum number of current-interchange points in the circuit, from line lead to the load lead. This provides ample capacity without overheating for years to come.

Greater Resistance to Corrosion

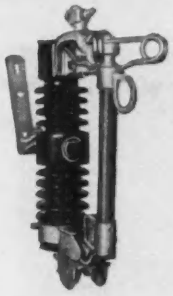
L-M uses high-strength, low-alloy corrosion-resistant steel, such as Cor-Ten, for all non-current-carrying parts, except the hanger. Cor-Ten steel has a yield point at least 1½ times that of structural steel and about twice that of mild carbon steel. Its ability to withstand atmospheric corrosion is 4 to 6 times greater than mild steel.

The results of a 16-year test, shown in the curves, prove the superior corrosion resistance of the low-alloy corrosion-resistant steel hardware furnished with L-M's "HDO" cutout.

Other Outstanding Features

- The "HDO" offers many other desirable features:
- Top contacts and center hanger mounting have through-bolts with insulated heads to provide complete bird-proof protection.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY



Distribution Class Single Insulator Type

L-M's standard mounting "HDO" cutouts are rugged, easy to operate with hook-stick. All current-carrying parts are silver-plated to assure cool operation.

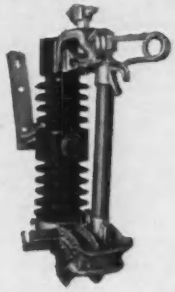
Two Insulator Type

Distribution post insulator mounting of L-M's "HDO" cutouts provides additional creepage distance for applications in industrial and coastal areas.

Complete Line of Open-Type Cutouts from 5.2 kv to 27 kv

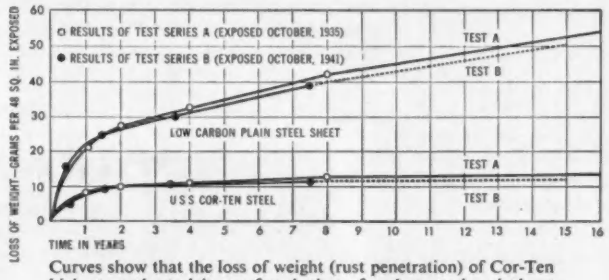
Power Class

Substation mounting is also available. L-M's "HDO" cutouts provide high interrupting capacity, economical fuse replacement, easy operation with a hook-stick and long life.



Load Break

Easy pulling action of interchangeable load-break cartridge will break the link. Arc interruption is completed inside the tube, assuring fast, safe switching of either inductive or capacitive load currents. Available in 5.2, 7.8, 15 and 27 kv ratings.



Curves show that the loss of weight (rust penetration) of Cor-Ten high strength steel is one-fourth that of carbon steel and about one-third that of copper steel after 16 years exposure to *severe* industrial atmospheric conditions. Steel of this type is used for all non-current-carrying parts of the "HDO" except the hanger.

COR-TEN is a registered trademark of U. S. Steel Co.

SIZES AND RATINGS

Cartridges	Interrupting Capacities, Amperes 5.2 KV	7.8 KV	15 KV	27 KV
Normal-Duty Single Venting (Solid Cap)	3000 A.	3000 A.	2000 A.	1200 A.
Heavy-Duty Double Venting (Heavy-Duty Cap)	6000	6000	4000	4000
Heavy-Duty Single Venting (Solid Cap)	5000	5000	4000	
Extra-Heavy-Duty Double Venting (Heavy-Duty Cap)	10000	10000	8000	

- All cartridges are designed for easy hook-stick removal and replacement.
- Top contacts are husky, hard-drawn copper, silver-plated. They serve as guides so the tube cannot miss top contacts.
- Cartridge is firmly anchored; the tube cannot move upward, even when it is accidentally closed in on a fault, within its rating.
- Cutout interrupts any fault current, from minimum melting of link to maximum interrupting capacity of cutout, *with any size link*.

Complete Line of Cutouts

L-M offers a complete line of cutouts in 5.2, 7.8, 15 and 27 kv classes, with a full line of fuse cartridges in normal, heavy, and extra heavy-duty interrupting rating, switch blade, and interchangeable load-break cartridges. All cartridges (except the 27 kv) use standard 20-inch distribution fuse links.

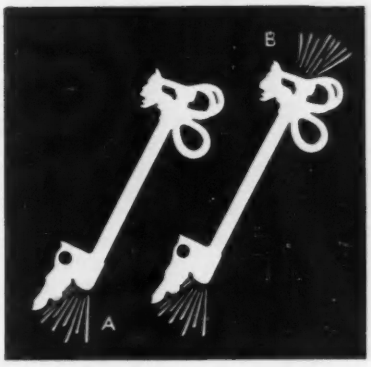
Interchangeable Load-Break Cartridge

Line Material's "HDO" open-type cutout has optional interchangeable load-break cartridges available in each voltage class and interrupting rating.

A pulling force of less than 30 pounds is required to break the largest size link. The cartridge is designed to interrupt all capacitive and inductive loads up through 100 amperes and to completely extinguish the load current in the tube. With L-M's simple load-break device you can switch loads or sectionalize distribution circuits quickly and easily with very little increase in your cutout investment.

Get Complete Information

Ask the L-M Field Engineer for bulletins and complete information about L-M's full line of open and enclosed fuse cutouts and other protective equipment. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



How Double Venting Controls Pressure

On low-amperage faults, ample pressure is provided to insure fast arc extinction, by single venting at the bottom of tube, *A*.

On high-amperage faults, heavy-duty cap at top (*B*) opens so that pressure is vented at both top and bottom of tube, providing greater safety by eliminating tube rupture. Note that the gases from the top are vented vertically—not horizontally. This eliminates danger of contact flashover.

fuse cutouts and fuse links

McGRAW EDISON

No. 3 in a series

Right off the Wire

A new system using multiple cathodes is said to double the life of the vapor lamps used on highways.

&

A thermionic converter has been made that produces electricity directly from heat with an efficiency of eight per cent.

&

Studies of the northern lights being made with a high-powered, long-range radar may disclose a method of defense against missiles coming over the arctic.

&

Submarine cable can be made in any length at the Simplex Submarine Cable Division's dockside plant. Single lengths are limited only by the capacity of a cable ship's hold, or the length of a train of gondola cars.

&

An electronic system of bank record keeping handles random-sized, unpunched paper checks at the rate of 1800 checks per hour to 40,000 accounts.

&

The world's largest solar furnace is being designed for installation in New Mexico. It will produce temperatures as high as 8,000°F.

&

Elimination of thermal noise by operating microwave amplifiers at the temperature of liquid helium has been found to greatly increase the range of radar.

&

An electronic map plotter is expected to make possible more accurate and cheaper maps from aerial photographs and to lend itself to the automation of mapping.

&

Plans are being made to mount telescopes on balloons in order to make observations above the interference of the earth's atmosphere.

&

The U. S. Air Force has patented an infrared television camera for use at night or in fog.

A new chemical plant will need no outside source of fuel after operation has begun. All the heat required will come from the process.

&

It has been found that one area of the human brain contains a record of every detail of the person's experience. Total recall can be produced by the stimulation of a minute electrical pulse.

&

Phosphors applied to textiles, sheet materials or metal mesh light up when a current is passed through them thus making draperies, for example, sources of illumination.

&

A new microscope for the study of living tissues uses bursts of ultraviolet light too brief (one thousandth of a second) to injure the tissue. The image appears in color on a television screen.

&

A new drug promises to save the lives of many persons who might otherwise die from lethal doses of radiation. It has been tried only on laboratory animals.

&

A form of fiber glass containing uranium 235 has been developed as a fuel for atomic furnaces.

&

A new amplifier is expected to extend the range of radio telescopes about ten times, enough to equal the best optical instruments.

&

A giant air mattress, equipped with arresting and launching gear, has been patented for use as a portable airstrip. On it planes could make belly landings without damage.

&

Tellurium lead cable sheath has excellent vibration, creep and age-hardening resistance, and greater flex life and tensile strength than other lead alloys, say Simplex scientists after exhaustive tests.

A new meter for oil pipelines will measure a flow of 10,000 barrels per hour (four times the capacity of present equipment) with an accuracy of one tenth of one per cent.

&

Simplex C-L-X (Sealex) metallic sheath is manufactured with thermoplastic covering in colors for voltage or general industrial coding.

&

A device called an "electronic sentry" guards against fire, abnormal pressure, high or low water levels, temperature changes and other hazards. It calls a designated person by telephone and gives a pre-recorded message.

"Tree" of Knowledge

This strange looking growth tells an important story to the expert eyes of Simplex scientists. It's a Simplex photomicrograph showing "treeing" effect that results when a 15 KV polyethylene-insulated cable is broken down by 100,000 volts. This is typical of the continuing research work done at Simplex.

If you are interested in the important facts that Simplex scientists Kitchin and Pratt have discovered on polyethylene treeing, write for their AIEE Paper No. 58-121.

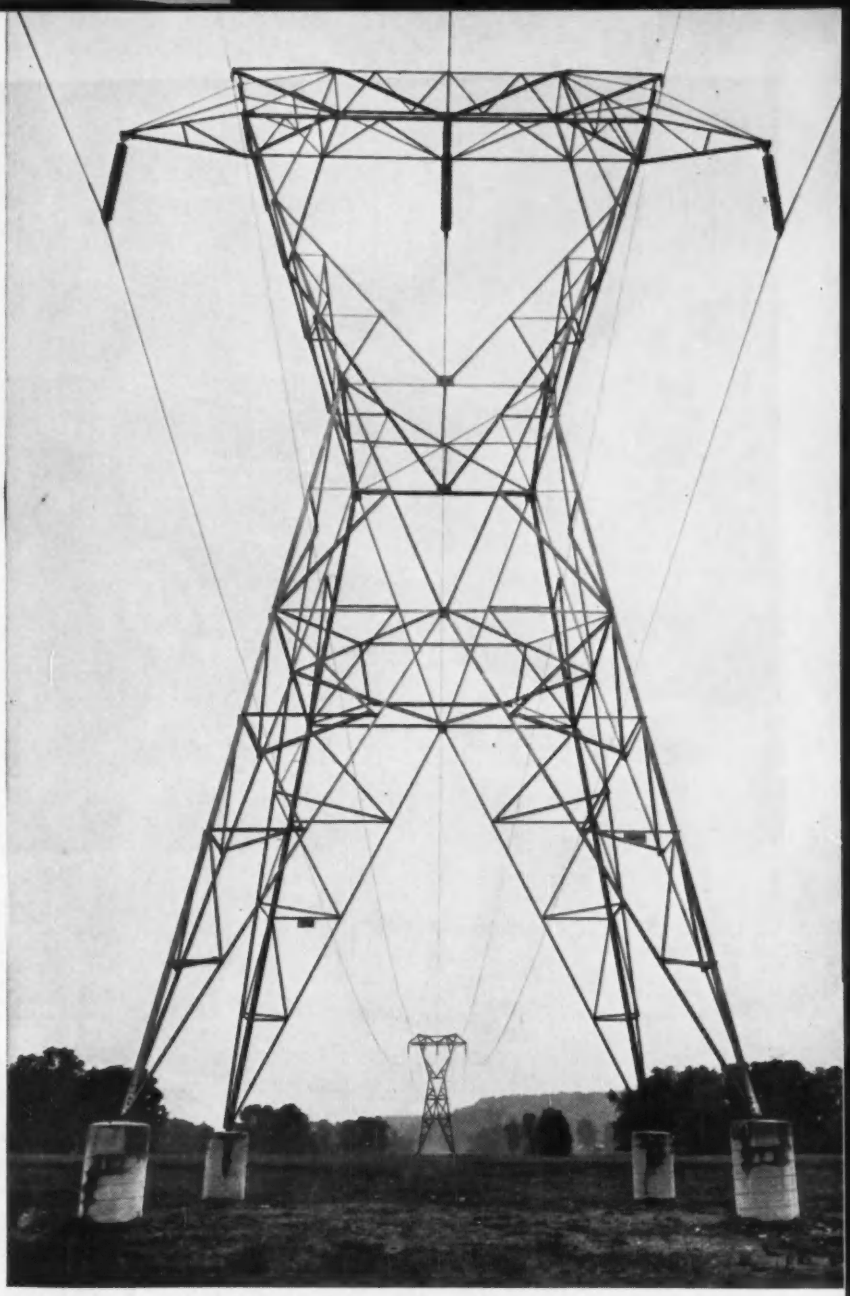
SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

Highest quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
Signalling

"The American manufacturers of transoceanic telephone cables"

To withstand severe flooding in the Brandywine Creek area, over three miles of towers were designed with special foundations.



Philadelphia Electric uses 110 Blaw-Knox Towers to bring more power to Delaware County

From Bradford to Chichester—that's the route of Philadelphia Electric's new nineteen mile line. Carrying 220,000 volts, the new line will bring increased power to the highly industrialized lower Delaware County area.

Working as a team, Philadelphia Electric and Blaw-Knox engineers designed new light-weight towers to support three 795,000 CM ACSR conductors and two 134,600 CM ACSR groundwires.

Combining specific tower requirements with solid concepts of good tower design has been a Blaw-Knox specialty for over 40 years. Backed by this extensive experience, these skillfully engineered towers are noted for outstanding structural design, simple field erection and easy modification.

Folder 2509 details this know-how in tower engineering and fabrication. Send for your copy and tell us your needs. We'll gladly give you our recommendations and a quotation.

Transmission Towers—Steel Transmission towers, custom-built for each installation . . . multi-circuit and other special structures . . . and antenna towers, guyed and self-supporting types for AM • FM • microwave • communications • radar • parabolic antennas.

BLAW-KNOX

BLAW-KNOX COMPANY
Equipment Division
Pittsburgh 38, Pennsylvania

BK-4403

REVERE Dual Gauge TUBE

of 80/20 Cupro-Nickel

used in A. O. Smith's feed water heaters in newest installation at Wisconsin's largest power plant

The six A. O. Smith Feed Water Heaters recently installed in the #4 unit of the Oak Creek Plant of the Wisconsin Electric Power Company, represent the fourth such set serving the four units. Heaters are 24" in diameter with overall lengths up to about 23'. Operating pressures are 2400-2500 psi. Enclosure and channel tested out at 4800 psi.

To take the kind of bending necessary in this "U" type heater, and still maintain the required wall thickness throughout its entire length, the tube must be of the best quality and of the proper, uniform grain structure.

Revere Mills have the facilities to produce just such consistently uniform tube while Revere's Technical Advisory Service has the knowledge to recommend the metal or alloy best suited to the job it must perform.

Whether your requirements call for dual or single gauge tube, why not take advantage of the vast storehouse of facts made available as a result of extensive data which has been compiled over the years by Revere's Research Department? Start the ball rolling by getting in touch with Revere's Technical Advisory Service.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

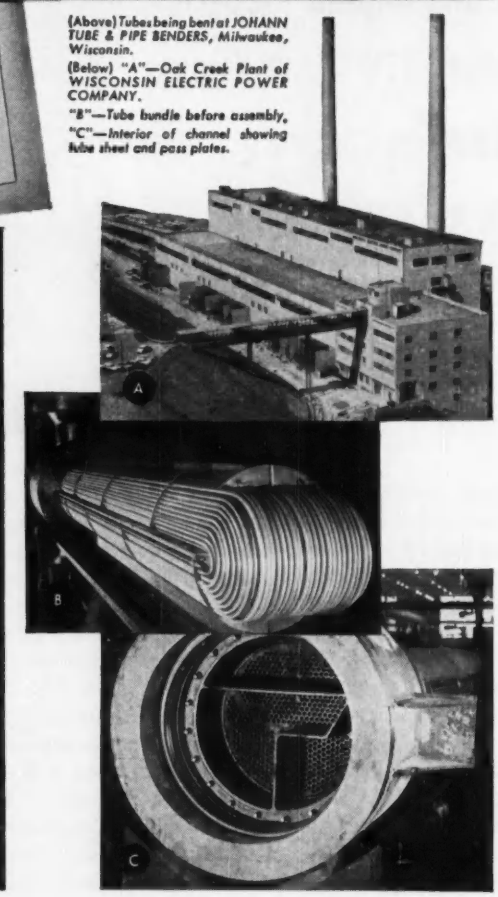
COPPER * BRASS * 1801 REVERE * ALUMINUM

(Above) *Tubes being bent at JOHANN TUBE & PIPE BENDERS, Milwaukee, Wisconsin.*

(Below) *"A"—Oak Creek Plant of WISCONSIN ELECTRIC POWER COMPANY.*

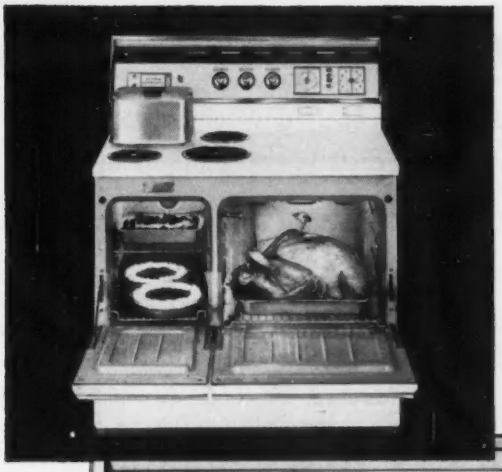
"B"—Tube bundle before assembly.

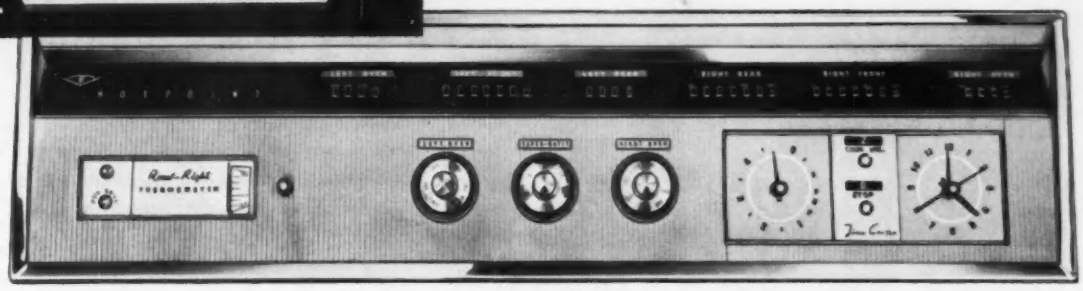
"C"—Interior of channel showing tube sheet and pass plates.



Hotpoint ELECTRIC RANGES

have the Difference
that builds load
and revenue...
automatically!





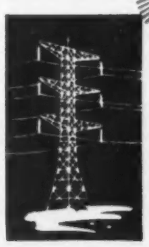
Hotpoint Electric Ranges help you build sales, load and revenue with all of the brilliant advances in quality, styling and completely automatic operation that make up the Hotpoint Difference. For example, the distinctive new control panel above provides automatic command of all surface and oven units—both time and temperature—at the touch of a button.

There's an exclusive new "thawer oven" that thaws frozen foods faster, doubles as a surface baking unit. And a new "touch open" storage drawer that glides out in response to a touch of the toe or hand. An exclusive musical meat thermometer, controlled with one simple setting, plays an appropriate tune — "Tenderly" — when the roast or fowl is done just right.

These imaginative, yet practical advantages are just a few samples of the sale-exciting features offered by the dramatic Hotpoint Difference. It's the Difference that will boost your electric range sales—and make a profitable difference in building future load and revenue.

Ask your Hotpoint Distributor to show you the Hotpoint Difference in the 5 NEW 39-inch models and the 3 NEW 30-inch models for 1958!

LIVE BETTER ELECTRICALLY



LOOK FOR THAT **Hotpoint** ***DIFFERENCE***

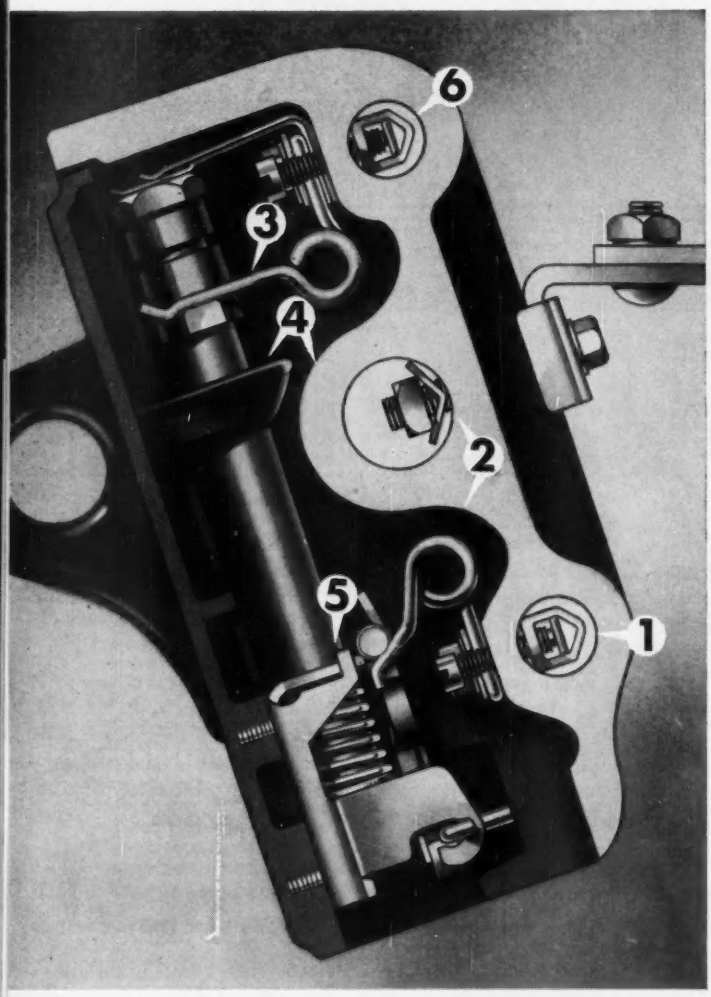
(your customers do!)

These are the cutouts linemen prefer...

KEARNEY TRIPOMATIC

ENCLOSED CUTOUTS

Check these KEARNEY Tripomatic features . . . each developed and tested to provide the most dependable protection for your distribution equipment.



1. A porcelain wall *isolates* lead-in holes for back connected terminals from the cartridge chamber.
2. Parts fastened with bolts extending through housing . . . cemented attachments eliminated. Contacts and hanger bracket *can't* loosen or pull out of housing.
3. When fuse link blows, resilient spring contacts absorb impact of tube recoil, preventing shock damage to entire cutout. Since the contacts *remain* in adjustment, high contact pressure is maintained even after long service.
4. Engineering of box interior and the collar around the tube restricts gas movement from lower to upper contact. Internal short circuits are prevented.
5. Positive dropout through spring backed toggle mechanism.
6. Fully plated stirrup type terminals. 50 amp. cutouts take No. 2 str.; 100 amp. ratings take No. 3/0 str.

FIELD-TESTED—At KEARNEY's Substation Laboratory of 150,000 KVA Transformer capacity—with a back up power of 445,000 KVA—all equipment is tested under rigorous field conditions. KEARNEY Certified Ratings are actual, proved performance ratings . . . not just theoretical calculations.

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. SHELBYVILLE, KENT.

The Mark of Quality

KEARNEY PRODUCTS

they're easiest to fuse...

No nuts, no bolts to tighten! Exclusive construction of the KEARNEY Tripomatic makes it the fastest, easiest cutout to fuse.

Here's how simple it is:

Thread standard buttonhead fuse link through cartridge, and tighten cap . . .

Snub the fuse link cable *over and around* the toggle . . .

Pull cartridge back against its stainless steel spring until toggle arm drops in place over lug, locking fuse cable in place. Mechanical breakage is prevented because correct tension is placed on every fuse link!

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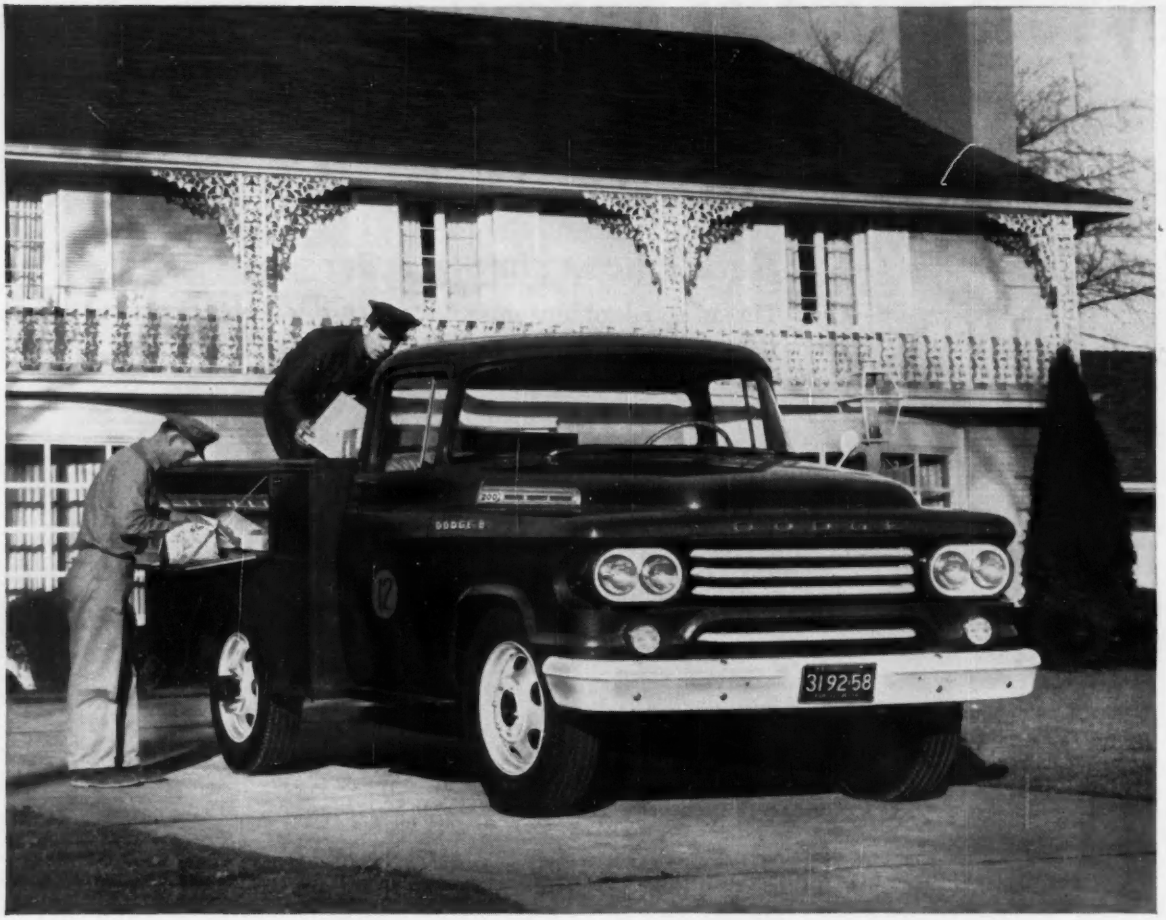
JRK-352RR



Shown: New Dodge Tradesman—a pick-up with side lockers.

You get extra quality at no extra cost— Dodge is one of the low-priced 3!

You may be surprised to know, for instance, that a standard Dodge *Power Giant* V-8 pick-up costs $2.66 *less* than pick-up "F", and only $5.50 more than pick-up "C" . . . that a rugged Dodge *Power Giant* panel costs less than either panel "F" or panel "C"*. Yet Dodge *Power Giants* give you many more advantages, leading the low-priced three in all four important ways:

First in power! Discover the extra traffic pep and extra pulling power that you get from *Power Giant* V-8's, with up to 27.5% more power than competitive trucks.

First in payload! You'll find you get as much as ⅓ more payload per trip, because *Power Giant* construction adds extra strength without adding weight. You save trips, man-hours and fuel!

First in economy! In addition to low first cost, you save with exclusive Dodge Power-Dome V-8 engine design that gives you extra gas mileage and reduces power-robbing carbon deposits.

First in styling! Your business gets a prestige bonus with a Dodge *Power Giant*. Its striking dual headlights, massive new grille and flowing, sculptured lines set new truck styling trends.

Despite all their advantages, Dodge trucks are priced with the lowest. So before you buy any truck, look into these handsome, rugged new *Power Giants*. Compare *trucks*, and compare *prices*. See your Dodge dealer soon, and get his special 40th-Anniversary deal!

**Based on official factory-suggested retail V-8 prices.*

4-way leaders of the low-priced 3

DODGE *Power Giants*

WHEN you consider expansion...
the most important investment
you can make is in
the creative ability of men.

Experimental "air lift" speeds power-line construction in rugged mountain area. Helicopter carries tower components to remote sites, and strings cable.

FLUOR

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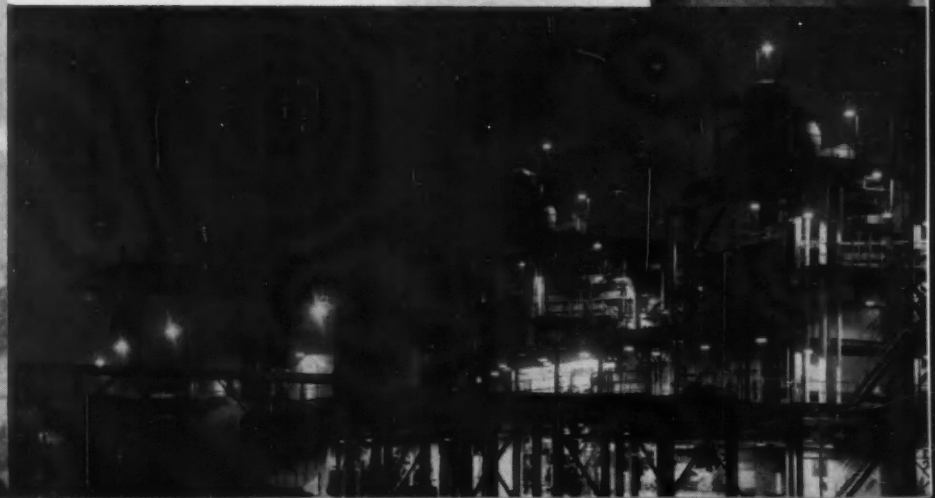
Engineers & Constructors
2500 S. Atlantic Blvd., Los Angeles



This Strand Is Armored

. . . armored against attack by rain, snow, sleet, ice, and fume-laden air.

It's Bethlehem strand with the ductile bethanized coating that frustrates corrosion. It's the strand with the long life-expectancy. You can install it with complete confidence, and forget about it for years.

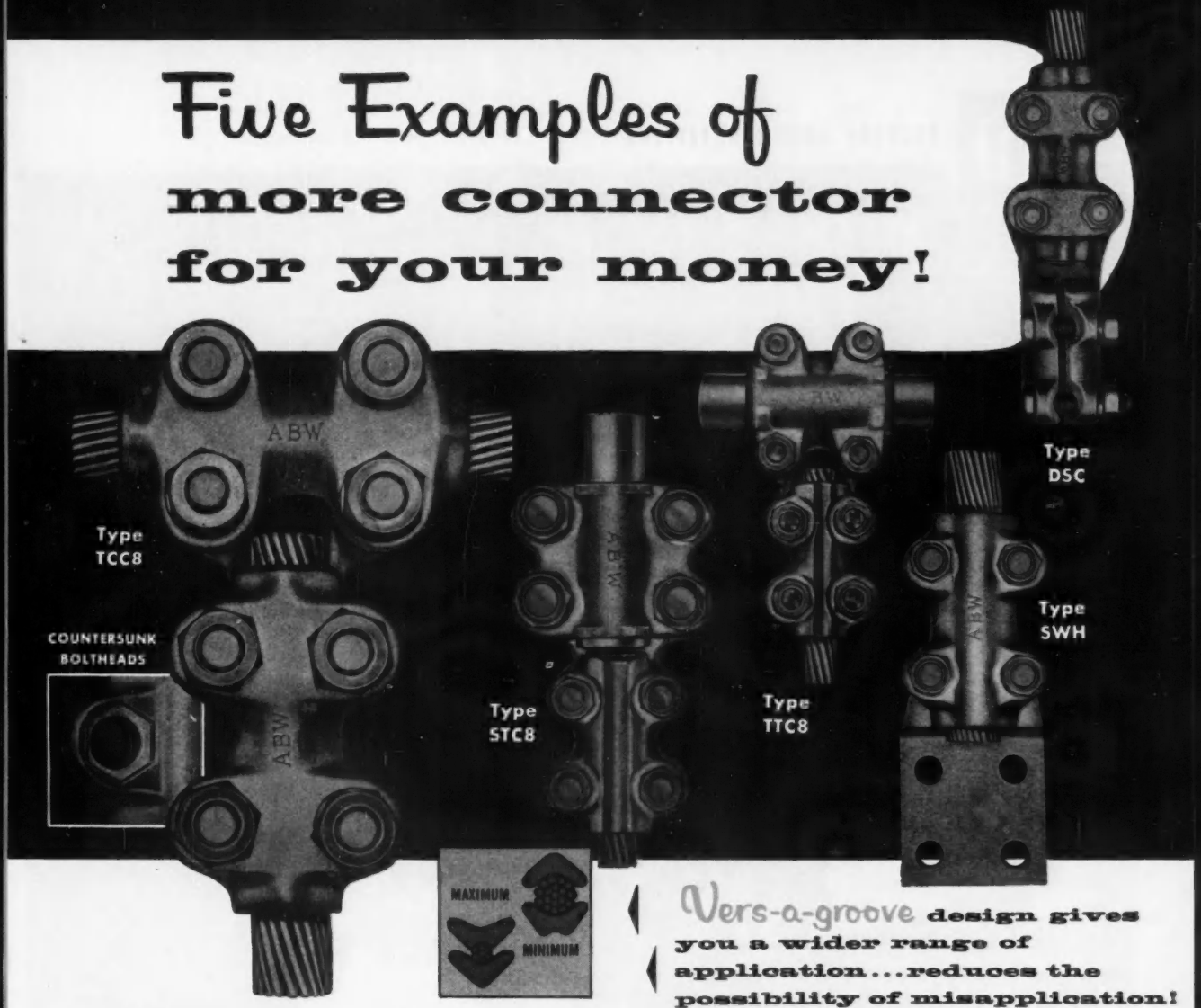
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Five Examples of more connector for your money!



Vers-a-groove design gives you a wider range of application... reduces the possibility of misapplication!

The 9 *stand-out features* of these Anderson Substation Connectors cannot be duplicated by any other connector line available. Look over these features carefully... *several manufacturers may claim some of them, but no connector line has them all!*

1. Two complete pairs of clamping bolts on both main and tap provide *extra insurance* against connector failure. *Most other designs have only six bolts.*
2. Higher clamping pressures with greater contact lengths *than in other standard connectors.*
3. Completely independent (3-piece) clamping on main and tap. Connection can be removed on one side without disturbing contacts on the other. *Most other connectors are two-piece.*
4. Conductor range practically eliminates mis-application and resulting connector "burn-downs". *Limited or no range of other connectors invite mis-application trouble.*
5. Wider conductor ranges permit considerable reduction in overall number of connectors which must be carried in inventory. *Two and three times greater inventory is required with other connectors.*
6. More connector for the money! More metal... 8 bolts instead of the ordinary 6 bolts!
7. One of the greatest advantages of these Anderson Vers-a-groove Tee Connectors is *ease of installation.* The 3-piece design, with independent clamping on main and tap, means that tap conductors may be bolted in on the ground and passed up to install over the bus runs. *Ordinary 6-bolt, 2-piece connectors much more cumbersome and difficult to handle.*
8. Cast surfaces which are inherently rough and tough mean positive electrical contacts. This feature plus the greater clamping strength of these connectors is *a distinct advantage in overall efficiency.*
9. The design of these connectors, by Anderson, has proved itself over more than 27 years of service under all conditions in all parts of the country. *Once used... tried and proved... no customer has ever switched back to an ordinary connector.*

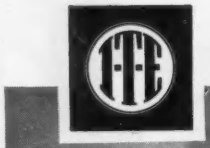
For more complete information, including engineering and design data, performance characteristics and other particulars, consult your nearest Anderson Representative, or write to our home office.

ANDERSON ELECTRIC CORPORATION • Birmingham 1, Alabama

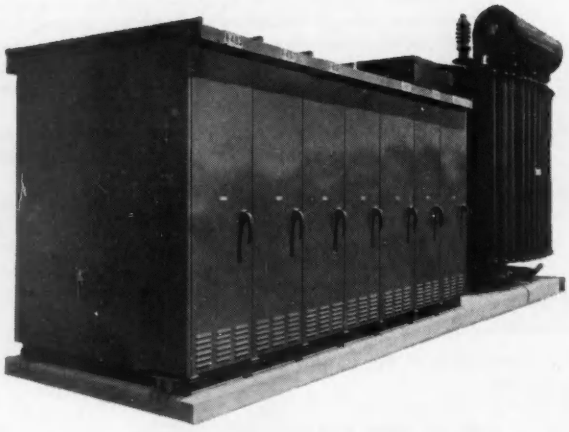
ANDERSON ELECTRIC

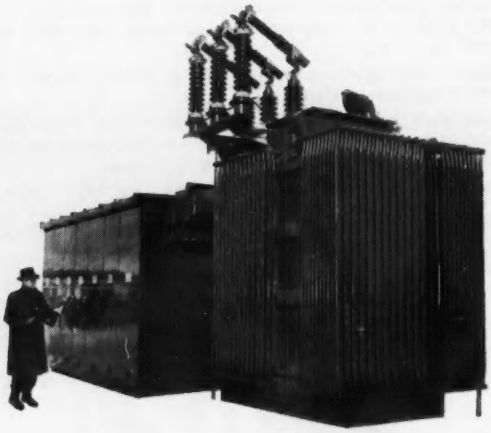
Research | Quality | Performance | in Aluminum and Bronze Products

Aluminum and Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION



PRIMARY UNIT SUBSTATIONS



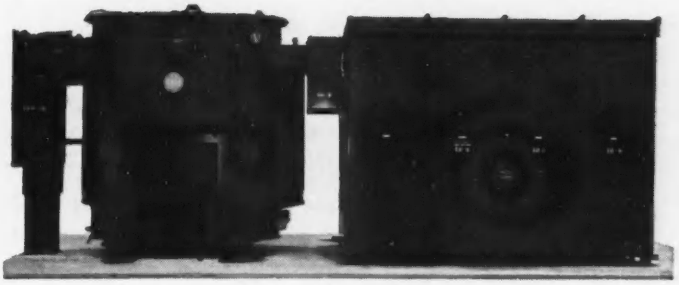


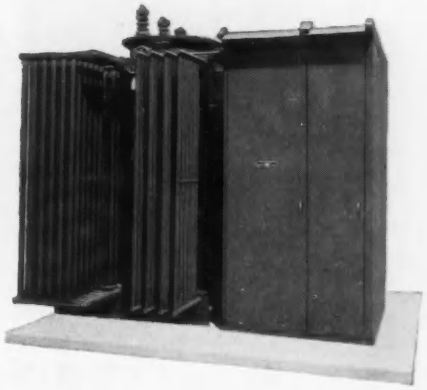
Winning Value Recognition All Over the Map

Look around you today. You will see more I-T-E PRIMARY UNIT SUBSTATIONS going into service everywhere—in places where orders are placed after careful evaluation of several different makes. The growing trend toward I-T-E substations reflects the response of shrewd buyers to I-T-E's standing policy of giving more value for no more money. I-T-E engineers work with you in the planning stage . . . custom design the station to meet your particular requirements . . . skillfully arrange I-T-E's quality components into an efficient unit that gives you the maximum value for the minimum investment . . . make deliveries to meet your construction schedules. Make I-T-E your dependable, single source for complete PRIMARY UNIT SUBSTATIONS.

For information, write I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada, Eastern Power Devices Ltd., Port Credit, Ontario.

I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA



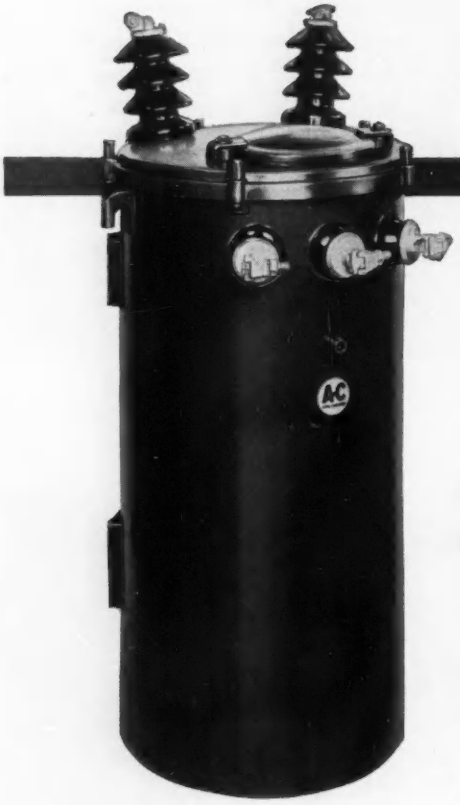


Craftsmanship at Allis-Chalmers

..includes

Careful Crating

of Distribution Transformers



Advanced engineering and manual skill at Allis-Chalmers extend even to the crating operation. Exhaustive shock tests of crate designs combined with care in manufacture assure safe arrival of shipments . . . protect the outstanding performance and long life built into every Allis-Chalmers distribution transformer. You save time and money in handling costs, as sturdy construction of crates keeps damage to a minimum. Each crate bears the seal of approval by the National Safe Transit Committee.

Pallet base facilitates safe, easy handling

The pallet base of the Allis-Chalmers transformer crate affords the speed, convenience and safety of fork truck stacking . . . promotes maximum utilization of valuable space. Because of its sturdy construction, the crate base may be reused for your own materials handling and storage.

For the complete craftsmanship story, see your Allis-Chalmers representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5487

MARCH 10, 1958

Are We Having Another "White Sale"?

Are we having another "depression" or another "recession"? That is about the same kind of question as, "are we having another white sale" or another "softness in prices"? It all depends upon who you are and where you are.

Now the utilities are in a kind of recession in that their industrial load is not growing. For a short period they may actually have a little excess capacity. However, they are managing to increase income by way of increased residential and commercial sales and rate increases that could provide $100 million additional revenue.

There is no doubt about the utilities needing these revenue additions. They need them to secure a fair return on invested capital to pay the bond holders and the stockholders. Utilities have to earn a fair return in order to secure more capital to buy electrical equipment in order to grow and provide better service. Utilities also need more revenue so as to have funds for research in the fields of nuclear energy, high voltage cable, etc.

Now the same recession that the utilities are in is also affecting other business including the electrical manufacturers. These manufacturers are not so fortunate in being able to increase business and net income, not only because of the recession but due to a very serious softness in prices. Some say it is as bad as during the "white sale" of a few years ago.

The electrical manufacturers need a fair return to pay the bond holders and the stockholders. They need money for capital expansion in order to provide all the equipment needed by electric utilities in the years ahead. They need funds to carry on research in the nuclear and high voltage cable fields, etc.

We believe that utility management will want to consider the problems facing the electrical manufacturers while shopping around for their equipment. They will want to consider the need for preserving the quantity and health of their suppliers. Certainly they are interested in the research and development activities of electrical manufacturers.

Robert B. Gear, director of purchasing, Commonwealth Edison Co, put this idea pretty succinctly in a speech before the recent Utility Buyer's conference. Said Gear:

"Every buyer owes it to himself and his company to obtain all reasonable worth in what he buys. But if he goes beyond reason—if he imposes excessive and improper pressure—well, maybe he can drive a harder immediate bargain, but maybe it turns out to be no bargain for him at all in the long run. This kind of buying is like trying to squeeze more out of a grapefruit than there is in it. This may bring bitter results."

Another white sale will benefit no one. If it comes to pass, then there may not be so many good places to shop in the future.

Pacific G & E's 60-Mw A-Plant to be

Utility's 60-Mw, $20-million unit to serve remote load in high-cost fuel area. Eight mills per kwhr is predicted cost

For the first time, a U. S. nuclear power plant, in a conventional businesslike cost comparison, has been shown competitive.

As expected, the "economic breakthrough" was achieved in a high-cost fuel area with a specialized power supply problem.

With full confidence in the cost figures, Pacific Gas & Electric Co has announced it will build a 60-Mw, all-nuclear addition to its existing Humboldt Bay oil-fired steam plant 6 mi south of Eureka (see cut).

General Electric Co will supply the single-cycle boiling water reactor and all electrical equipment. Under separate contract, it will fabricate the fuel. Bechtel Corp will be prime contractor for plant design, procurement, and construction.

The utility asks no subsidies or financial assistance in any form from the government or anybody else. The plant will be built on a fixed-price, turnkey contract.

PG&E's Eureka service area, presently logging 90-Mw peak demands, is connected to PG&E's bulk power transmission system by two 115-mi 110-kv circuits, each with about 40-Mw capacity.

In 1957 PG&E rolled a 50-Mw quick-pickup oil-fired steam unit at its new Humboldt Bay site (EW, Apr 1, 1957, p 56). Its mate will follow this year. Following a policy to maintain 100% generation reserve standby in Eureka, the utility projected a need for a third 50-Mw unit by 1962.

The third unit, if conventional, would cost roughly $11 million, taking advantage of land already owned and installed common facilities. With 1962 fuel cost estimated at $3 bbl (there's no gas or coal; oil is barged in), the overall net cost of energy at Humboldt Bay bus would run close to 8 mills per kwhr—a composite of hydro, transmission and fuel plant charges.

Faced with this cost situation, PG&E engineers felt that a 60-Mw atomic unit might be competitive.

Lessons learned with the 5-Mw Vallecitos Experimental Boiling Water Reactor instilled confidence in this approach. First, the 4,950-kw electric unit was built for about $3 million, considerably less than estimates. Both GE and the plant designer-constructor, Bechtel, were confident what they'd learned at Vallecitos could be projected to greater economies on a commercially-sized unit. Second, Vallecitos' operating experience indicates

Utilitymen to Congress: We're Spending $ to

Private utilities assure Joint Committee on Atomic Energy that industry is investing heavily to bring day of economic A-Power, but concede federal help may be needed

Spokesmen for private electric utilities assured Congress last week that the industry is making heavy investments to hasten the day when atomic power will be economic in this country. But they generally conceded that more federal help will probably be needed.

Industry representatives brought the Joint Committee on Atomic Energy, which is conducting its annual hearings into the state of the civilian atomic industry, up to date on progress made by utilities in the nuclear field.

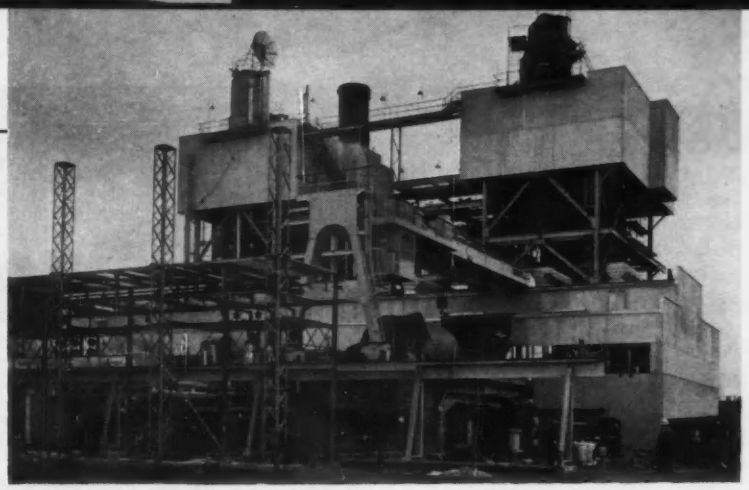
Utility witnesses generally felt that the current program is adequate for strictly domestic needs, and that federal construction of reactors is inadvisable. But they agreed that more government help may be needed if the U. S. is to play a commanding role in atomic power development abroad.

Elmer L. Lindseth, president of Cleveland Electric Illuminating Co and chairman of EEI's atomic power committee, placed the industry's case before JCAE.

Reviewing progress in the last 3½ years, he said 123 utilities are participating in A-programs, and:

- To date, 14 nuclear projects have been proposed involving a total utility company investment of $500 million—exclusive of what AEC may spend on some of the projects. Three projects already are in operation, six are under construction or contract, and five are planned.
- Additional projects are expected to grow out of 12 research, development, and study programs.
- In the past year alone, three nuclear plants in which utilities are participating began operation. These are Vallecitos and Santa Susana, in California, and Shippingport.

"Our industry looks to the future of nuclear power with confidence," says Lindseth. "Technical feasibility of generating power with nuclear



Competitive

stability and ease of operation—and long life of the fuel elements.

The Humboldt Bay A-unit will be a single-cycle boiling water unit of the same conceptual design as Vallecitos. It will use 1,000-psig, 545F (saturated) steam circulated naturally directly from reactor to turbine, and be rated 165 Mw(t). A complete internal steam separation and drying system and the most advanced design of refueling equipment will be used.

Capital costs, by conservative estimating, are about $20 million, 82% more than a conventional unit. To variable costs was added $250,000 annually for insurance, including upped premiums for the existing units because of proximity of an atomic plant.

But the fuel cost comparison brings the nuclear unit back into the picture: rental of uranium from the government (about $5-million worth for one core), plus around $3 million fabricating costs for one core plus necessary standby inventory, showed an annual fuel cost of about $1.04 million at 90% capacity factor, against $2.35 million for the conventional plant using oil at $3 a bbl.

Overall, the estimate shows the projected A-plant can meet the conventional station's 8-mill power if the former could be loaded to 90% capacity factor. Experience at Vallecitos with maintenance and fuel handling, plus new techniques available, convinced the engineers this was feasible.

The 2%-enriched UO_2-pellet, zircaloy-clad fuel for Humboldt will have an expected life in the 3.5-4.25-yr range under projected operating conditions. Total operating costs with the first core are predicted at 8.7 mills per kwhr; with the second core the expectation is 8.1 mills.

PG&E's study on a 200-Mw nuclear plant, announced last year, still continues. In fact, negotiations are under way to purchase land for the big station at an unspecified coastal location. But Humboldt's economic advantage—looking from the nuclear side—isn't evident yet on the main system.

Hasten A-Age

fuels has been clearly established. But economic feasibility is another matter."

Lindseth agrees the nation's objectives in atomic power—domestic and foreign—should be defined more specifically.

"We . . . believe any steps indicated to achieve the objectives as defined should be carried out within the framework of our free enterprise system," he cautions. "We have always viewed with great concern proposals to build government-owned nuclear power plants."

However, he agreed that continued expansion of the atomic program will probably require an "increase in government financial assistance and participation."

Another champion of private development appearing before the committee was J. B. Thomas of Ft. Worth, Texas, Electric Service Co, president and spokesman for the recently formed Texas Atomic Energy Research Foundation.

The spokesman for another utility group, Southwest Atomic Energy Associates, told how the companies are employing North American Aviation's Atomics International Div to conduct a $5.3-million study into possible development of an epithermal thorium reactor.

The spokesman, Pres J. Robert Welsh, Southwestern Gas & Electric Co, said SAEA consists of 15 utilities in Arkansas, Texas, Louisiana, Missouri, Mississippi, and Kansas. SAEA's objective is ultimate construction of a large plant having a capacity between 200 and 400 electric Mw.

Clyde T. Ellis, general manager of National Rural Electric Cooperative Assn, made a scathing attack on capabilities and motives of private companies.

He charged private power companies have always "opposed any effective federal program to provide the people with low-cost energy in any way, shape, or form."

Further, he charged, "Rural co-ops are not welcome at the AEC," where he says the agency makes it difficult for co-ops to participate. Renewing support for Gore-Holifield bills, which call for federal construction of reactors at AEC installations, Ellis accused AEC Chairman Lewis Strauss of playing a "numbers game" in defense of partnership.

He ridiculed what he called Strauss' implication that "unfettering" of private responsibility has led to construction, or beginning of construction, on 42 power reactors in 1957. Practically all these reactors were built at government expense, he testified.

Other highlights:

- Proposal by Dr Lee Davenport,

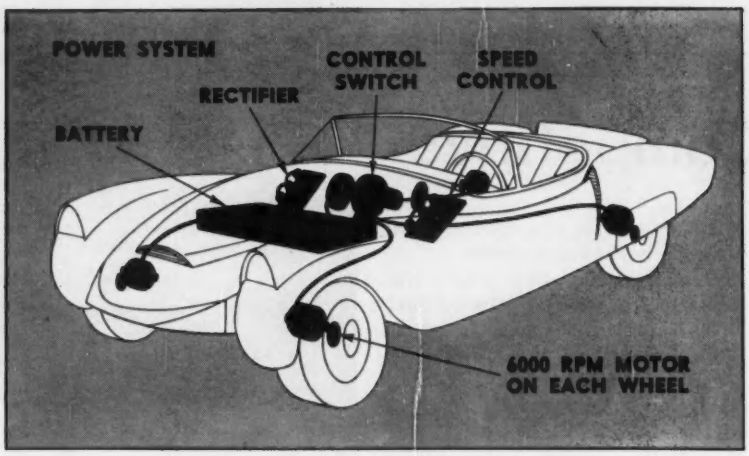
(*Continued on page* 42)

A-Age Spending . . .

(*Continued from page* 41)

president of Sylvania-Corning Nuclear Corp, to permit utilities to receive rapid depreciation of no longer than five years on A-facilities approved by AEC.

- Report of EEI's Technical Appraisal Task Force on Nuclear Power by Consolidated Edison VP J. F. Fairman. Task Force believes there is a good probability of cutting nuclear power costs in next 10 yrs to make it competitive with fossil fuels in some parts of U. S. It did not specify the best reactor for this, but recommended further research.
- Complaint by National Assn of Manufacturers that American inventors and contractors are "left out in the cold" by present patent provisions of the Atomic Energy Act.
- A request by Philip Sporn, president of American Gas & Electric Co, for legislation making possible $9.9-million in federal help for development and operation of a reactor in Florida, planned jointly by the East Central Nuclear Group and Florida West Coast Nuclear Group. Sporn, speaking for East Central, said the 50,000 kw, gas-cooled reactor would cost $50.2-million, and produce power at 11.9 mills/kwhr.
- Statement by a spokesman for Rural Cooperative Power Assn, Elk River, Minn., that RCPA has decided to put in a conventional boiler to fill the gap until an atomic reactor is built.
- A strong assertion by Francis McCune, general manager of General Electric's Atomic Products Division, that government ownership of reactors would accentuate the public-vs-private power fight and development of competitive atomic power. He also expressed doubt that American manufacturers will be able to compete for atomic markets in advanced countries abroad because the U. S. is "high cost producer of capital equipment."
- A proposal by John Menke, president of Nuclear Development Corp of America, that the government undertake a 10-year, $200-million program for construction of heavy water reactors at home and abroad. The plants would be built and owned by private enterprise, but manufacturers would be paid 85% of the difference between price of conventional plants and nuclear plants.



With an eye on modern markets . . .

The 'Electric' Is Coming Back

After almost 50 years in the museum, the electric auto may soon return to the highway—sleek, safe, and clean as an electric light bulb.

Rebirth of the "electric" may be closer than you think. H. Drake Harkins, mechanical engineer of Fort Lauderdale, Fla., and a director of Atlantic City Electric Co, says:

"The modern electric auto is ready now for the research laboratory's final touches."

Biggest challenge to the research laboratories is the development of a medium-sized battery storing enough energy to power the car for daily use.

Harkins solicited comments on the electric from 81 top men in the utility, coal, battery, and electrical manufacturing industries. The consensus: The car has possibilities, but a suitable battery will take much development. Many also wondered if the public, used to high horsepower, would accept a low-speed car.

Harkins thinks the electric car is the answer to the nation's traffic problem, and the answer to many a driver's budget problems as well.

"Listen to this," he says: "Here is safety; no 100-mph speed; no flash fires from gasoline; no carbon monoxide; safe, simple braking.

"Here is compactness: three feet shorter than a conventional car; it takes up that much less road space, and it's easy to park.

"Here is economy: an electric can probably be produced at ⅓ the cost of a modern combustion-engine car, and it should cost about half as much to operate.

"Then it's simple. Charge your batteries at home with any 110-v ac outlet. No gear shift, no clutch, no choke, no stalling. Just turn it on and go; turn it off and stop.

"Here is a town car—a second car—for nearly every American family. It is perfect transportation for the middle-aged, the retired, who do not want speed and its hazards. The electric will glide along at a comfortable 35.

"It is also perfect for teen-agers whose parents are concerned over recklessness and drag races," Harkins adds.

For electric utilities, it is a near-perfect off-peak load. Says Harkins:

"When only 200,000 customers plug in their electric autos at night for recharging, the revenue can exceed $8 million a year. The potential beyond that is the limit of your own imagination."

Power system of the electric auto would consist of a battery with a rectifier to permit charging from a standard ac source; on-off control switch and speed control; and a 6,000-rpm drive motor on each wheel. Regenerative dynamic braking would be supplied by the motors themselves.

With a plastic or light-weight metal body, the entire car should weigh less than 1,000 lb.

Troubleman Nips A Traffic Jam

Robert Corwyn, Duquesne Light Co troubleman, exemplified the range of jobs that men of his title take as a matter of course during a six-alarm fire in Pittsburgh late last month. Corwyn is shown here cutting the 120/240-v service drop leading into one of three buildings which were destroyed. The line was delaying the fire department's positioning of aerial rigs. Transformer for the area already had been cutoff at this stage of the fire.

The blaze destroyed three buildings, caused $100,000 damage, and threatened an entire block of warehouses in the produce district of the city. The fire started in a wholesale paper products firm that had been condemned in mid-February. Newspapers around the nation featured this Associated Press photograph of the action.

Busy Bargaining Year Ahead for Utilities

Early contract hassles and settlements portend an eventful 1958 for industrial relations men in electric utilities

There'll be some protracted bargaining sessions over wage contracts this year if early union-utility sessions are a reliable bellweather.

No sign of settlement was evident at Kyger Creek plant but negotiations were resuming as EW went to press. Workers at the 1,075-Mw station of Ohio Valley Electric Corp have been on strike since Feb. 23.

Supervisory employees have been handling operation and maintenance of the plant. This included repair of a boiler tube to restore a 215-Mw unit to service March 1 after a one-and-a-half day shutdown.

Main issue is a 6% wage increase sought by Utility Workers Union of America (AFL-CIO). The union was voted representative for Kyger employees subsequent to a 5¾% increase granted Sept. 1957. OVEC has stated that another increase will not be forthcoming before sometime in September of this year.

Kyger Creek is one of two plants used by OVEC to serve the power mission at its Portsmouth plant. OVEC is jointly owned by 15 power companies in Ohio, Maryland, West Virginia, Indiana, Pennsylvania, Virginia, and Kentucky. A national UWUA officer said picketing would definitely begin at plants of the 15 companies.

Negotiations were underway also at Consumers Power Co at press time. Union and company representatives were arbitrating with state and federal mediators on demands for a wage boost and changes in fringe benefits.

The UWUA seeks another holiday, three weeks vacation after ten (instead of the present 12) years employment, and added sick leave benefits. A union official told newspapermen he thought a settlement would be reached on March 5.

Consumers' two-year contract expired Feb. 28. UWUA agreed to an extension until last Wednesday.

Settlement of fringe benefit issues averted a strike March 1 at Columbus & Southern Ohio Electric Co. The agreement includes a 12¢ an hour average wage and fringe package.

Overhead lineman, who got a 5¢ an hour hike, are now the highest paid in the state by an 11¢/hr margin, C&S said. The company also authorized a 5% across-the-board increase. The two-year contract has a wage reopener clause for 1959.

Consolidated Edison Co of New York, Inc, signed with UWUA and IBEW members on a 22-month pact. It provides a general wage increase of 17½¢ an hour, plus about 21¢ an hour in fringe benefits. Cost to the company will be approximately $17 million. Union members ratified the contract by a 10,135 to 7,793 vote.

Interconnections Avert Trouble in Plant Outage

Emergency help from interconnections with other systems enabled Wisconsin Electric Power Co to carry full load recently, despite accidental outages of three generating units with an aggregate 290-Mw capacity.

First outage occurred Jan. 9 at the company's Oak Creek Plant when a 130-Mw unit shut down "due to very unusual circumstances in the high pressure turbine of this cross-compound unit," WEP said.

At the end of the month two 80-Mw units at the Port Washington Plant were removed from service. Cause was attributed to trouble of an electrical nature, which resulted in damage to stator coils, core iron, and insulation in one of the two units, and to "substantially less damage" to the other.

The least affected Port Washington machine went back on the line Feb. 9 and has since carried full load. The harder-hit unit will be down to about April 1, or "only six weeks longer than the annual outage for inspection and maintenance" previously scheduled.

Restoration of service on the Oak Creek unit is expected about May 1. No curtailment of load has been necessary, WEP said. The situation has been eased by return of the 80-Mw Port Washington unit and lengthening daylight hours.

FPC Grants Permit for 5,000-Kw Alaska Project

The Federal Power Commission has agreed to consider a proposal for a 5,000-kw hydro project in Alaska which would serve Healy, McKinley Park, Suntrana, Usibelli, Lignite, and vicinity.

The 24-month preliminary permit granted to John Chandler Slagle of Nenana, Alaska, gives him the right to priority application for an FPC license while he makes the necessary studies to determine economic feasibility of the project.

The project, on the Nenana River, would consist of a rock-fill dam 90 feet high, a side channel spillway, a 700-ft tunnel with 8 ft dia, and an underground powerhouse.

'ELECTRICITY AT WORK' scholarship pays 18-year-old Gene Meyer $500 and TV set for his school from T. W. Delzell, Portland General Electric Co board chairman. The boy's Corona wind loudspeaker won top prize in PGE-sponsored contest

Utilities Give Education a Lift

The inquiring spotlight now focused on the nation's schools seeks an answer to how the U. S. educational effort stacks up against Russia's.

The U. S. effort, in part, reflects contributions from industry, including electric utilities' help for promising students.

Fifteen replies to a quick EW survey shows at least seven companies sponsoring 90 scholarships. Total value reported was $72,825.

Of the 15, Detroit Edison Co underwrites 46 scholarships a year valued at $23,400. Kansas Power & Light Co backs 15 annually valued at $27,000, and Utah Power & Light Co, 12 worth $7,200.

Consolidated Edison Co of New York said it had no scholarship program "as such," but does help 25 employees attending engineering school at night. The company meets half the tuition expense as long as the student's work remains satisfactory.

Public Service Co of New Hampshire has no scholarship program, but assisted the state university in the semester ending in June, 1957. The company loaned an engineer who taught electrical engineering and conducted laboratory exercises that semester.

Montana Power Co supplements four scholarships with a $9,800 donation to schools. Furthermore, executives give lectures and counsel, and the company conducts utility-management clinics for college classes.

Alabama Power Co has no scholarships, but pays part of the cost of selected correspondence courses. The help is limited to certain employees. The company grants leaves of absence up to two years for employees seeking degrees in related work-courses. The company also participates in a co-op program, in which engineering students are paired and alternate in school and on the job. While working, students are paid the regular job salary.

Idaho Power Co contributes $13,000 to schools annually, and provides aid to employees' children. Under this program, loans are made to parents for their children's college expenses. Summer employment for employee's children is another aid.

Philadelphia Electric Co does not provide scholarships, but, under a plan begun in 1920, reimburses a "generous portion" of an employee's tuition costs when he passes approved night-school courses. During the 1956-57 year, the company paid $13,150 through the tuition refund plan to 248 employee-students, of which 98 were taking engineering.

Better Power Plants Grow Out of Indoor-Outdoor Controversy

Consultant tells Pennsylvania Electric Association that most clients are satisfied with present station design practices

Most utilities are satisfied that their present power plant design practices best suit their particular requirements. So said H. C. Schweikart, Gilbert Associates, at a recent joint meeting of the Pennsylvania Prime Movers and Structures and Hydraulic Committees. To back up his conclusion, Schweikart presented data on new plants that went on the line in 1954 through 1956. The study showed that the relative percentages of indoor, outdoor, and semi-outdoor plants have remained fairly constant.

His appraisal dwelt more on the advantages of both indoor and outdoor plants rather than on the controversial aspects of a comparison of these plants. He said that the competition between advocates of indoor and outdoor design has actually resulted in better and more economical plants for all classifications of enclosures. The competition has fostered the use of less expensive construction materials. Cited as examples of this were substitution of asbestos-cement or aluminum panel for brick walls and the use of prefabricated roof decks.

Personnel Preference Important

Schweikart cautioned his audience about applying strict financial evaluations as the sole criterion in comparing the merits of indoor and outdoor design. For one thing such a method will not account for personnel preferences for working conditions. This can be listed as an advantage by both sides of the controversy. And it depends not only on the plant location but also daily changes in weather. He also indicated that it is conceivable in making such an analysis to compare the most expensive indoor design with the cheapest outdoor design. This of course would not be a fair comparison.

The PEA members also heard T. S. Fetter, Philadelphia Electric Co, suggest that the ability to produce a fly ash that is marketable in terms of carbon content should be given serious consideration as a means to alleviate the fly ash disposal problem. Reviewing Philadelphia Electric's fly ash problem, Fetter related that the use of fly ash concrete is now permitted under the Philadelphia Building Code. He cited a $125,000-140,000 savings by its use in a Philadelphia Electric generating station.

Sheet Piling Replaces Concrete

Another cost cutting idea was mentioned by J. G. Miller, Metropolitan Edison Co. Miller described a sheet piling temporary end wall that will be used instead of a reinforced concrete one at Portland station.

The end wall will be supported by concrete at the bottom, structural members in the middle and building steel at the top. A shallow trench inside the wall will serve as a sump if one is needed.

D. R. Werley, Pennsylvania P & L Co told the meeting that heated condenser water discharge does not have any injurious effect on aquatic life. In fact the warm water is apparently beneficial to aquatic life most of the year. This is the preliminary conclusion of a study on this subject now being conducted by PP&L at its Martin's Creek plant on the Delaware River. The test showed that there is usually a higher concentration of fish in the warm water than in the normal river water. Temperature readings taken during the test indicated that the water temperature about 4,000 ft downstream from the plant is within 3% of the river temperature above the plant.

345-Kv Tie-Line Link Nears Completion

A 345-kv tie line that will initially be worth about 200 Mw of generating reserve to each system will be in service early this spring for Commonwealth Edison Co and American Gas & Electric Co. The 90-mi line runs from a Commonwealth terminal near Orland Park, Ill. eastward to New Carlisle, Ind.

The double-circuit link will have six 1¾ in. dia conductors carried on some 500 towers with 145 ft average height.

The line is but one of many projects underway by Commonwealth Ed. The Chicago-based utility estimates it will spend $600 million on property additions during the next four years. Three new generating units totaling 815,000 kw capability are scheduled for service this year.

The 1958 additions include two 305,000-kw generating units; one at Waukegon, another at Fisk Station in Chicago. A 205,000-kw unit at Crawford Station is also due for completion this year. Other additions to the Edison system to be completed by the end of 1961 include two more 305,000-kw units and the 180,000-kw Dresden Nuclear Power Station. Dresden is scheduled for completion in 1960.

How Dayton P&L Modernized

EEI Equipment Committee hears of the many innovations resulting from plant expansion

Frank M. Tait Generating Station of Dayton Power & Light Co figured prominently in the recent meeting of Edison Electric Institute's Electrical System and Equipment Committee. It was inspected by the group, and the innovations of its recent modernization were discussed during committee sessions.

Modernization of Tait Station involved installation of the first once-through boilers to be used at conventional pressures in the U. S. (EW Dec. 23 p 52). Each produces 940,000 lb of steam per hr at 2400 psi 1050F and reheats at 1000F for use in two new 130-Mw turbogenerator units. These units were installed in space provided by removal of 70-Mw low-pressure boilers and turbines.

Expansion of Tait Station provided opportunities to add new coal-handling facilities, achieve substantial smoke abatement, and eliminate congested and hazardous control-cable. Moreover, it allowed more time to elapse before applying advanced designs in an entirely new station using super steam pressures, higher temperatures, and, ultimately, other forms of fuel. Because of Tait's proximity to load centers, existing lines could be augmented at reasonable investment and entry into 230 or 345-kv transmission could be postponed, R. B. Killen told the committee.

Estimated cost of Tait expansion was given as $145 per kw of net capability of new units, which includes revamping of coal handling facilities. These machines have a net heat rate of 9,224 Btu per kwhr. Net capability of Tait Station when completed will be 443 Mw.

A simplified procedure in interconnection energy accounting was described by M. J. Lacapo, American Gas & Electric Service Corp. The scheme eliminates need for recording the end-of-month balance in the Regulation Energy Account as a transaction with another company. In lieu of such a record Lacapo showed how an account called Loop Operation Regulation Account can be included in financial records under Other Current and Accrued Assets (FPC 133). At month's end, net kwhr delivered or received, as recorded in the Regulation Energy Account, are reflected under Interchange Power Transactions as part of FPC Operating Expense Account 739. Dollar amounts for the purpose are based on an average cost per kwhr that is a measure of incremental energy cost.

Essentially the same scheme is used by the Illinois-Missouri Power Pool, said T. D. Schroeder, Illinois Power Co. Walter Fisk, Consolidated Edison, noted that the scheme may be desirable in highly complicated power pool operations. E. K. Cochran, Interchange Power Services, Inc, Des Moines, said that experience has expelled early apprehensions growing out of the introduction of such dollar accounting procedures in interconnection energy accounting.

Basic substation designs used on the Cincinnati Gas

Utilities in 6 States Adopt Sample Testing

EEI-AEIC Meter Committee focuses attention on new scheme for cutting testing costs

Sample testing of meters in lieu of periodic testing was the focus of EEI-AEIC Meter and Service Committee at Philadelphia Feb. 17-19. Already adopted by utilities in 6 states and under study in 5 others, it is expected to bring extensive economies in metering costs.

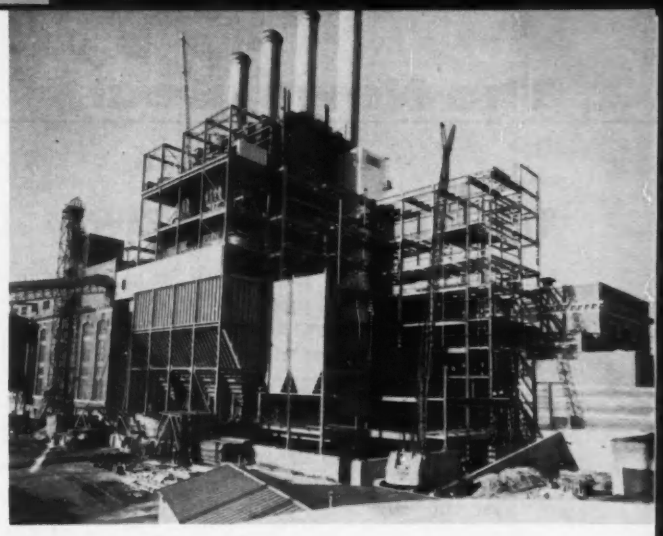
An industry survey reported by J. A. Morris, American G&E Service Corp., reveals that 37 of 60 reporting utilities have studied statistical sampling procedures. Meters would be classified by type in 26 utilities, by area in 9, and by age in 17, with some utilities applying more than one criterion in their classifications. Analysis of data would be by the method of variables in 11 utilities and by attributes in 3; the remaining companies have not selected a method. As to size of sample, 1% was preferred by 7 companies; 5% by 2; and 2½%, 6%, and 10% by one company each.

Only nine of the reporting companies have sought commission approval of the random sampling method, continued Morris. But the result has been approval in Virginia, West Virginia, Tennessee, North Carolina, and South Carolina, the last two temporary. In Ohio random sampling complied with existing rules. Applications are pending in Kentucky and New York. Indiana deferred ruling on sample testing but extended the test period to 10 years with further extension to 15 after 5 consecutive years show not over 2% of tests exceeding 103% registration.

The survey also showed 21 utilities in favor of adding the random sampling method to ASA C-12, the Code for Electricity Meters. Morris explained that this point was included because code treatment would win more consideration for it.

Sampling techniques are well established for other uses, commented C. V. Morey, Consolidated Edison Co. The real problem is the meters themselves—how often to check each and how to pick the one that is outside accuracy limits. Sampling will determine when any new type should be tested, said Morey, but no method can assure locating a stray fast or slow meter.

Tait Station



& Electric system were described in detail by C. W. Berringhause. Among the innovations was a lightweight precast concrete trench, with removable top, for enclosing substation control cable. The cover provides easy access to the trench while serving as a substation walk. Necessity of insulating equipment from ground where fault bus protection is used on 132-kv substation buses and circuit breakers lead to development of a special porcelain insulator for use between steel bus structures and foundations. Circuit breakers are isolated by Masonite die-stock between the breaker frame and foundation. Berringhause said faulty bus protection eliminates numerous current transformer connections necessary for a bus differential scheme in a substation with a large number of circuits.

The newly revised dimensional standard for apparatus bushings should be in printed form in late March. The standard ASA C76.1a-1958 has now been submitted to the American Standards Association for approval by ASA's Standards Board, J. H. Vivian, Southern California Edison Co, disclosed.

Initial steps are being taken by EEI committees toward a new EEI-NEMA standard for noise levels of power transformers, L. J. Gill, Pennsylvania Power & Light Co, reported. Until such a standard is developed it has been suggested that manufacturers hold maximum noise level in a single direction within 3 db of the average for new units. Work is also progressing on new methods of measuring noise, Gill said.

Status of FCC proceedings affecting utility radio and microwave facilities were reviewed by Glover Fallon, Baltimore Gas & Electric Co. The past year, a critical one for power radio users, saw 12 orders by FCC in two categories: (1) Split channel developments involving rule-making procedures, and (2) fact-finding investigations bearing on reallocation of the frequency spectrum in radio and microwave ranges.

Perhaps the most far reaching of the fact finding investigations, Fallon said, concerned reallocation of assigned utility microwave frequencies above 890 Mc. Utility views presented to FCC by the National Committee for Utility Radio showed the essential nature of the industry's need for microwave facilities. There is an expected increase of 79% in channel requirements for mobile systems in the next 10 years, Fallon said.

# of Meters; Studies Continue in 5 States

A 1% sample, only 7,445 meters for Virginia Electric & Power Co, revealed the relative accuracy of meters according to five age groups, said W. C. Harrison. The oldest of these meters are slated for early retirement because 5.9% of those in the sample tested were over 2% slow and 2.9% were over 2% fast. The second group showed 3.5% slow and 0.8% fast. But group 4, comprising 51% of all system meters, tested 99.2% within $\pm 2\%$ limits, and Group 5 was better.

A similar 1% sampling of meter record cards by Carolina Power & Light Co revealed that 20-year-old indoor meters mounted outdoors were more troublesome than the oldest meters, said E. B. Hicks. It also revealed 2.9 times as many inaccurate meters in rural locations as in urban.

Eighteen months of cyclic load tests of 24 Class 100 meters, adjusted according to Consolidated Edison practice, disclosed such uniformly high accuracy as to cast doubts on observed deviations from the standards with which they were compared. C. V. Morey reported that during this period the meters measured over 45,000 kwhr on a cycle of 100 amp for 3 sec, 50 amp for 6 sec, 25 amp for 12 sec,, 10 amp for 30 sec, and zero amp for 9 sec. This cycle was continued 6 hr in every 8, with the other 2 hr off. The average reading was 45,005 kwhr against 45,217 by the reference standards, and no meter deviated by more than 0.19% from the group average. These meters were standard designs from four manufacturers.

A survey of metering trends reported by A. D. Irion, Southern California Edison Co, disclosed only 5 companies not completely satisfied with Class 100 and Class 200 meters for residential use. But 7 reported a very limited use of 120/208-v 4-wire meters and one, 120/208-v 3 wire. Over 90% expected the new meters to be adequate for 20 years or more.

Metering of commercial and industrial service is preponderantly at 120/208-v 4-wire, 240-v-delta 4-wire, 480-v-delta 3-wire, and 240-v-delta 3-wire, but the survey revealed 27 companies also using 265/460-v metering. The majority reported present 480-v meters adequately insulated but would prefer load capability comparable with Class 100 and Class 200 in the single-phase category.

The News-Beat

Time's Ripe for Solar Energy

Widespread use of solar energy for home heating within five years is predicted by Henry Sargent, president of American & Foreign Power Co, New York. Encouragement of solar-energy heating and cooling is not "cutting our throats," he said while inspecting a solar home underway in Scottsdale, Ariz.

"Solar energy may augment electric uses and our industry should take the lead in a development as important as this."

Sargent believes the public doesn't attach enough importance to the sun's uses. "If only 10% of the funds devoted to nuclear research were channeled into solar research, we'd be making many more breakthroughs than we are now," he said.

Formerly head of Arizona Public Service Co, Sargent was instrumental in organizing the Association for Applied Solar Energy.

On the TVA Vine . . .

Herbert D. Vogel, Tennessee Valley Authority chairman, in a recent talk suggested formation of a Tennessee-Cumberland Valley Association to promote future development of the valley. The region TVA serves "will die on the vine" unless the agency is allowed to continue development, he told the Knoxville Chamber of Commerce.

"Too long the people of the valley have looked to TVA to tell them what to do," Vogel said. "Now we want to turn it around, and the TVA wants to look to you to tell it what to do to advance the interests of this great region."

Watch Dog Role for Labor

A union role in rate regulation—this is the plan of the Communications Workers of America. It has announced plans of furnishing data to regulatory agencies on labor costs of new contracts, and exercising influence on appointments or elections to both U. S. and state rate-making agencies.

Russian Dawn Patrol

A potential audience of one million New Yorkers will have a chance to learn basic Russian—if they don't object to an early rising. Station WRGB-TV, the General Electric Co's Schenectady outlet, now offers the course twice a week from 6:30 to 7 A.M. Under the joint sponsorship of WRGB, the Mohawk-Hudson Council of Educational TV, and the Northeastern branch of American Chemical Society, the course is aimed at speeding dissemination of Russian technical literature for U. S. scientists and engineers.

Insull Defends Name

A libel suit for $4 million has been filed by Samuel Insull, Jr, against nine Scripps-Howard newspapers, a Harvard professor, two authors and their publishing firms. The 57-year old son of the founder of large midwestern utility holdings said the suit "marks the first attempt of us Insulls to strike back at a 25-year old unorganized but consistent campaign to vilify us."

The suit claims the defendents wrote or published that the father or the son were convicted of crimes or were imprisoned as a result of the depression era collapse of the utilities owned by Insull, Sr.

Insull said he and his father were acquitted every time charges were brought out in open court. The elder Insull died in 1938. At one time the father was president of 11 corporations, chairman of 65, and a director of 85.

To Tax or Not to Tax

In Wyoming, 12 towns are contesting the taxation of municipally owned electric utilities. The individual suits are being consolidated for a hearing in district court at Cheyenne.

The state board of equalization ruled last summer that such plants are subject to assessment and taxation under a new constitutional amendment adopted by voters in November, 1956. But the towns maintain they are exempt because municipal power plants are a "government function" and thus could be exempt under a bill passed by the 1957 legislature. Cities involved are Torrington, Lingle, Fort Laramie, Basin, Cody, Gillette, Guernsey, Lusk, Pine Bluffs. Powell, Upton, and Wheatland.

From Cars to Campus

The State of Wisconsin has purchased a power plant from a recently sold Hudson Motors auto line. It will be torn down, shipped to Madison, and reassembled to provide more power for the rapidly growing University of Wisconsin campus. Purchase and moving costs are estimated at $4.2 million. The plant, first fired up in 1954, was used for less than a year when the auto line was shut down.

Tripping Scheme by Microwave Gives High-Speed Transformer Protection

Baltimore Gas & Electric installs transfer tripping scheme that uses two tones for reliability. Squelch circuit prevents false tripping noise

E. A. COCKEY, Electric Engineers Department, Baltimore Gas & Electric Co, Baltimore, Md.

Transfer tripping by microwave gives high-speed protection to transformers on Baltimore Gas & Electric Co's system, without the use of high-side breakers. It protects long, high-voltage circuits connected solidly to station ties and serves as back-up relaying when a breaker doesn't function.

Use of two tones affords a reliable system for guarding against incorrect tripping by accidental transmission of tripping tones. Yet random noise from the microwave set, fed into the tone receiver, as tests show, can operate the tripping relay. To guard against such tripping, a fast-operating squelch circuit has been installed between the microwave and tone receivers. This circuit was designed by the company's engineers.

Usually, intelligence for initiating transfer tripping is transmitted by direct impulse over telephone wires, or by high-frequency transmission over either telephone wires or high-voltage lines.

Long-distance Tripping Sought

Short lines have had transfer-tripping coverage over company-owned telephone lines. What Baltimore G&E wanted was transfer tripping over long distances where communicating channels were not readily available. In its investigations, it sought to determine what would be the most reliable and economic channels for this application.

Telephone cables for transfer tripping between additional stations would be too costly and too long. Power-line carrier on the 110-kv lines was found to be impractical. The many taps radiating from the lines would require extensive trapping; the numerous carrier terminals involved would boost installation and then maintenance costs; and subsequent expansion of the 110-kv system would require much investigation and modification of the carrier system.

As microwave was coming into wider use, the company decided to study it for possible application to carrier relaying and transfer tripping, and equipment considered suitable was selected. In October 1950, a test channel was set up between terminals 13 miles apart. The equipment, designed for the 960-Mc band, was applied to the free-space channels operating in opposite directions between the two terminals. Each station had two 48-in. parabolic antennas, one for transmitting and one for receiving.

The 960-Mc equipment has microwave multiplexing equipment designed for seven voice channels, each having a band width of 2,500 cycles. Each voice channel is divisible into 18 subchannels or tones spaced 120 cycles apart, from 420 to 2,460 cycles. The voice-frequency channel (channel 1) is now used for relay and supervisory control, telemetering, alarms, and remote control. Its employment obviates use of a subcarrier on control functions.

Tone frequencies for transfer tripping range from 660 to 1,260 cycles. Simultaneous transmission of two individual tones initiates tripping. The tone transmitters at the near end are keyed on by contacts on the auxiliary relay which trips the local breaker. The auxiliary relay is operated by the equipment protective relays.

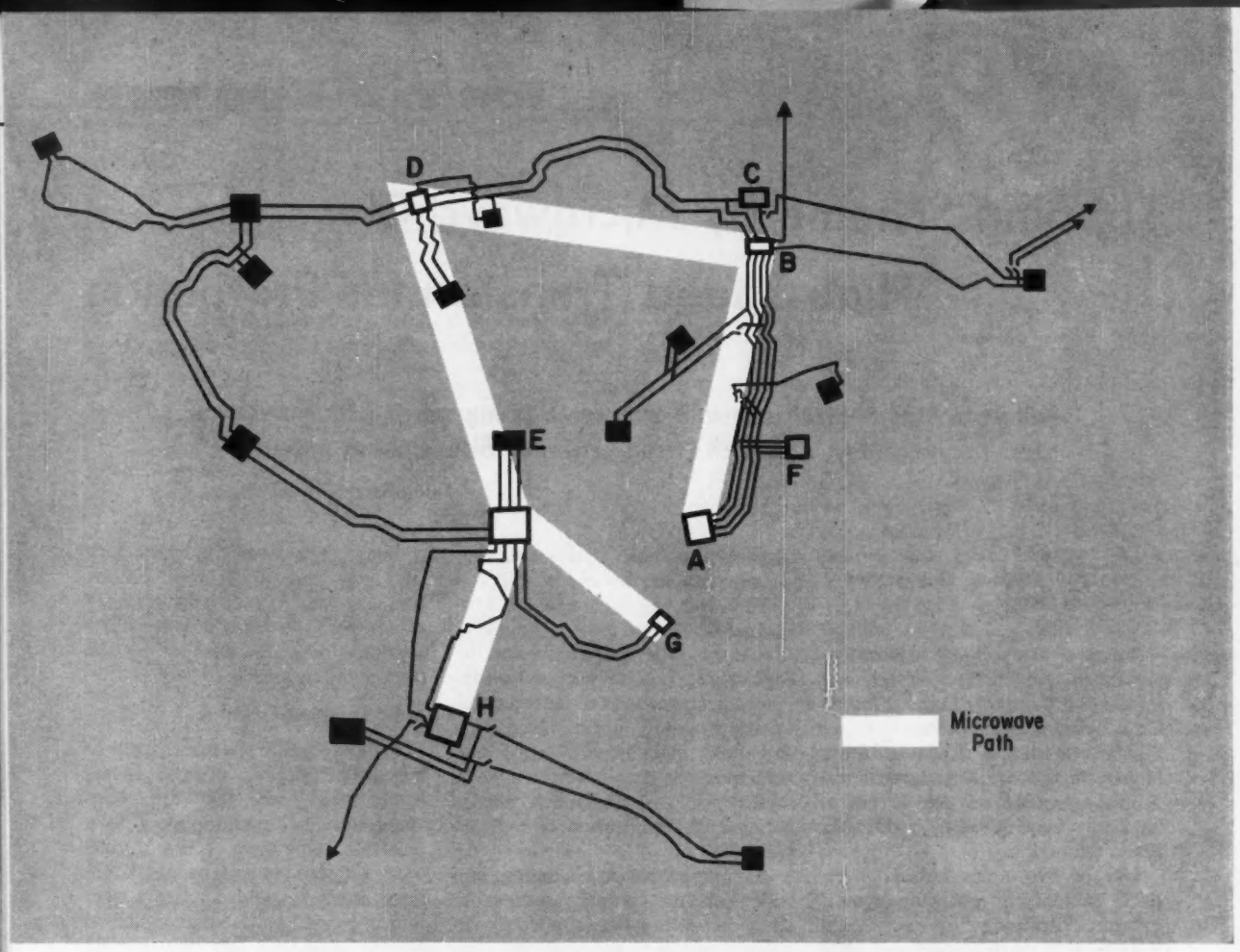
Must Operate Together

Tripping tones are transmitted to the distant station, via the microwave link. There they are channeled into the corresponding tone receivers. The tone receivers' output is fed into the coils of telephone-type auxiliary relays, the current through these coils being indicated by milliammeters on the control panel.

One set of contacts on each auxiliary relay is connected to the coil of an annunciator auxiliary relay which, in turn, is wired to a point on the station annunciator panel. The other set of contacts on each relay is connected in series to operate a tripping relay on the desired circuit breaker. Thus operation of either receiver auxiliary relay is called to the attention of the station operator. Only simultaneous operation of both relays trips the breaker.

Inasmuch as the tone equipment is built with two tone units on a single chassis, two adjacent tones are used for tripping on a particular circuit; for instance, 660 and 780-cycle tones trip a particular breaker.

Two tones for transfer tripping have some advantages. They minimize the possibility of undesirable tripping by accidental transmission of a tripping tone and provide a means of testing the transmission and reception of these tones. A test switch allows transmission of one



MICROWAVE SYSTEM provides high-speed protection for transformers at major installations on the Baltimore Gas & Electric system. The transfer-trip scheme serves to provide backup relaying should a breaker malfunction

tone at a time, while the distant end is checked for reception.

A tripping relay with an operating time delay of about 5 cycles (60 cycles base) is used for transformer protection. The overall response or relaying time—from the instant the tone transmitters are keyed on at the near station until the distant station's circuit breaker starts to open—is less than 6 cycles. As the oil circuit breakers have a clearing time of 5 cycles, the total clearing time at the distant station is less than 11 cycles after the trip relay at the near station is operated.

Providing for reliable, fail-safe, and quick removal of the tone receivers from service, when disturbance on the microwave link could produce incorrect tripping, was a major problem to be overcome before putting the system in service. A tone receiver depends upon the amplitude of a tone signal at its input to control a relay connected to the receiver output circuit. It can't distinguish between the presence of a tone transmitted from the distant station and random noise.

Random noise is usually caused by the loss of the incoming radio frequency carrier signal at the microwave receiver, or by failure of some portion of the circuitry in the microwave receiver itself. It may originate also in the tone or microwave receiver at the distant station and be retransmitted to the receiver at the near station.

Squelch Circuit Used

To guard against incorrect tripping from noise, a fast-operating squelch device is used. The device consists of a noise detector circuit, a dual-triode type control tube, a saturable reactor, and a built-in power supply furnishing heater and plate voltages for the control tube. The detector bridges the receive line at the microwave receiver's output. The saturable reactor is in series between the output and the one or several receivers to which it is being fed. The power supply is connected to the 120-v ac circuit supplying the microwave and multiplexing equipment.

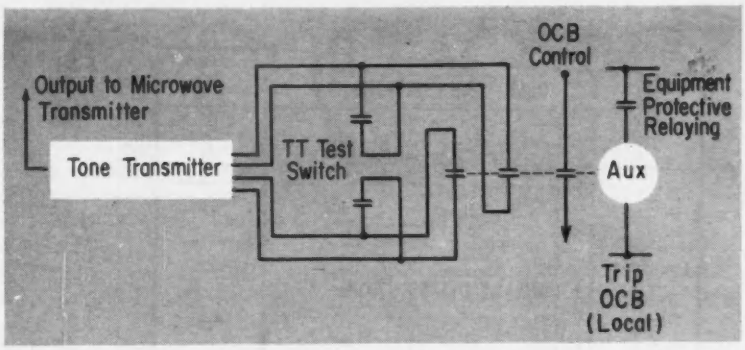
Normal output from the microwave receiver, applied to the noise detector section of the squelch circuit, produces a small negative voltage to be applied to the control tube's grid. This permits plate current of a value such as to saturate the magnetic circuit to flow through the winding of the saturable reactor. This flow of current reduces the impedance of the winding to its minimum value. Thus the audio

signal passes through the reactor with minimum attenuation.

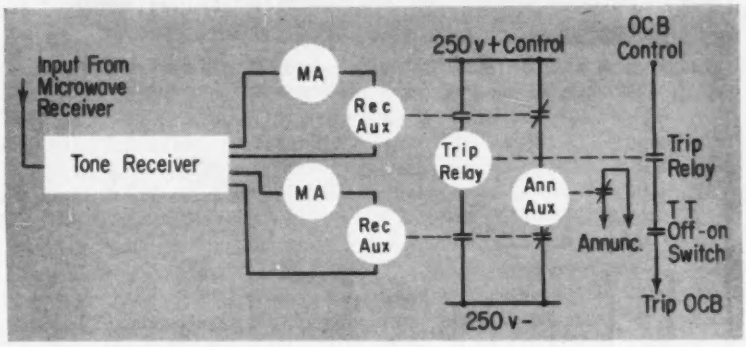
Interruption of the radio-frequency-carrier signal at the input to the microwave receiver occasions a relatively high voltage on the receive line. This voltage, in turn, causes a large negative voltage to be applied to the control tube's grid. This latter voltage, in this particular circuit arrangement, biases the tube to or beyond grid cut-off and reduces the plate current flow through the saturable reactor to a minimum. This action maximizes the impedance of the saturable reactor.

By proper selection of the reactor, the amplitude of the audio signal passing through the reactor and applied to the input of the tone receiver is cut to a very low value, so that, for all practical purposes, the input to the tone receiver is completely squelched.

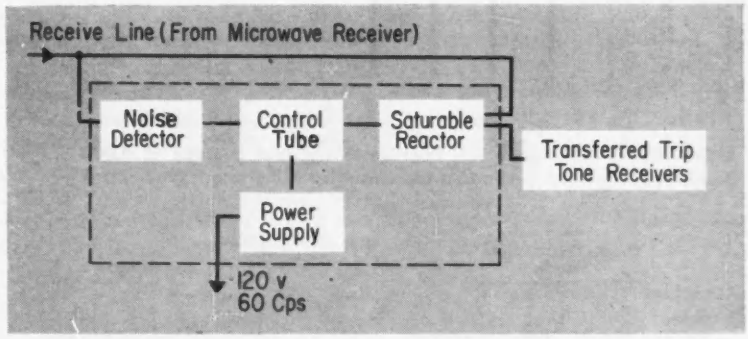
This type of squelch has proved very satisfactory. It is fail-safe inasmuch as heater burnout in the control tube, loss of either heater or plate supply, or failure of components introduces maximum attenuation in the saturable reactor. Operation is high speed, taking only about 5 millisec. As a relay is not involved, relay failure and sticking contacts are not a problem. All components are selected for operation at a very conservative rating to reduce heating and component failure. Tests about every three months check deterioration of the tube and components.



TONE TRANSMITTERS are keyed on at the near end by the auxiliary relay which trips the local breaker. Auxiliary relay is operated by local protective relays



OUTPUT CIRCUIT of the tone receivers feeds into the coils of telephone-type auxiliary relays. Current through the coils is indicated on panel milliammeters



SQUELCH DEVICE operates quickly to prevent incorrect tripping from noise. Its detector circuit bridges the receive line at the microwave receiver's output

Goes into Service

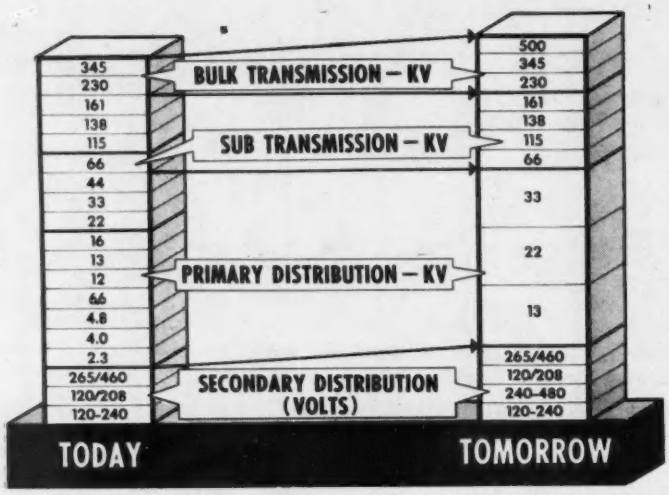
Transfer tripping went into service in May 1953 on two lines between stations A and B in the system diagram. The lines were tapped at station B to supply service some 20 miles away. Special impedance relaying was installed at these taps to detect faults anywhere on the lines, to initiate high-speed clearing by tripping the breakers on the faulted circuit at station B, and to transmit tones over the microwave channel to trip the breaker at station A.

After installation of circuit breakers there in May 1956, transfer tripping by microwave was no longer needed at station B. But installation of station F at this time led to changing the microwave system to operate between it and station B. The new station's 110-33-kv transformers were tapped to the 110-kv lines, and breakdown of either transformer initiates a signal. This signal to trip is now transmitted to the breaker at station A by wire and to that at station B by microwave channel. Recent installation of a third transformer at station F required a third transfer-trip circuit between A and B stations.

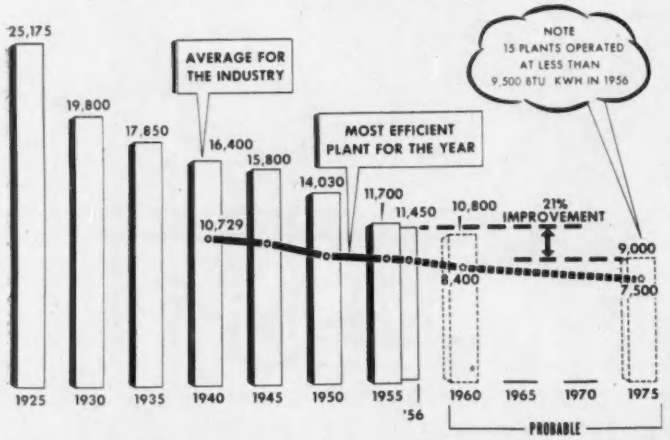
Transfer trip went into service in July 1953 between stations B and D to provide high-speed protection for a transformer at station C. This arrangement is similar to that just described, the breaker at B being tripped directly by a wire connection and that at D remotely by a signal over the microwave system.

Baltimore G&E plans to put mi-

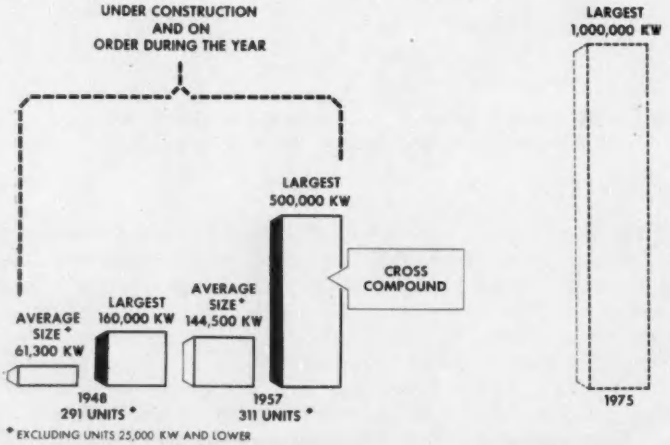
(*Continued on page* 94)



TRANSMISSION AND DISTRIBUTION systems in 1975 will have higher voltage bulk transmission and fewer voltage levels for distribution



STEAM PLANT EFFICIENCY will improve to national average of 9,000 Btu per kwhr in 1975, when best units installed will give a 7,500-Btu rate



STEAM PLANTS may have turbine-generator units of 1-million kw with boiler to match. It'll be once-through design for pressures near critical

U S Capacity

In 1975 the people of the United States will live in "a truly electric age." Thus augured a panel at a recent conference of Ebasco Services, Inc.

Composing the panel were: Howard Melvin, chief consulting engineer; R. E. Pierce, consulting electrical engineer; Paul Gourdon, consulting mechanical engineer; Arthur Larned, consulting civil engineer; and, Mel Kennedy, manager of sales, marketing, and public relations. Moderator was Ebasco's vice president, W. H. Colquhoun.

Here is a digest of the panel's predictions:

As suburbs grow, cities, as such, will lessen in importance, and the new, spread-out areas will tend to link up into "interurbias." A prosperous population of about 224 million, with more disposable income, will have higher living standards and, accordingly, greater electrical power needs. The electric utility industry will have generating capacity of about 410-million kw, and annual generation will approximate 1,850-billion kwhr. These figures are roughly thrice 1957's and signify an annual growth rate of over 6%. Some company demands will grow to 4 or 5 times, others to 2 or 3 times 1957 values.

Residential and rural customers will number 65 million, and average use will increase from over 3,000 to over 8,500 kwhr. Among new appliances accounting for some of this increased use will be such items as electronic ranges, electroluminescent walls, electrostatic dust collectors, ultrasonic clothes washers, and assembly-line food preparation from freezer to table.

Every new home will have year-round climate control, either heat pumps or combinations of air cooling and resistance heating. In a moderate climate, residential demands could reach 25 or 30 kw.

By then, planning and construction of transmission and distribution systems together with the substations required, will be influenced by esthetics to a greater extent than today. Many features of overhead systems which clutter up the sky around a pole will be replaced by self-contained transformers mounted

Will Hit 410-Million Kw in 1975

without crossarms and with services taken off a messenger opposite each house, the messenger having been cabled with secondaries. Perhaps, by then, ways will have been found even to make underground distribution economically feasible.

More distribution poles will be concrete, preferably prestressed, metal, or other material other than wood. Primary voltages will be the same in rural as in urban and suburban areas, and service reliability will be improved. Urban street lighting will be on attractive poles, and in business areas of two-story and higher buildings, possibly supported from the buildings.

Building wiring problems will be fewer, as today's gradual swing to higher utilization voltages takes effect. In newer area developments utilization voltages will be about 240 v, using a single-phase, 3-wire system of 240/480 v.

Primary voltages will not be much different than the higher ones today. They will be mainly 13 kv with more 22 kv and perhaps some 33 kv. Companies having primary distribution systems at 2.3 or 4 kv can be expected to convert directly to 22 kv. Large shopping areas will use the 3-phase, 4-wire 265/460-v system.

Steam to Remain Power Source

About 410-million kw of capacity will be needed to meet 1975 loads and provide necessary reserves. About 55-million kw of this capacity could be hydro. The remaining 355-million kw would be provided by steam and nuclear plants, an optimistic guess putting the latter at about 30-million kw. About 25-million kw of the nuclear capacity will be generating units and power plants that are economic base-load components of the power supply for utility systems. About 5-million kw of first and second-stage uneconomic capacity will have been built primarily as development projects.

A turbine-generator as large as 1-million kw and a boiler to go with it could be in use by 1975. Conceivably, the generator and transformer will be more closely coupled, so that they will come about as a single unit. For such a unit, the boiler plant will have an output of 6-million to 6.5-million lb per hr. It will be the once-through design for pressures near critical.

The 1975 steam plant will resemble today's advanced ones. There may be a transition design on the way to the single 1-million-kw plant, a single installation with two half-size units and boilers closely integrated and a single set of auxiliaries, piping systems, etc. Such a design would treat a two-unit assembly as one installation.

Outdoor and semi-outdoor types will increase, especially if enclosure prices continue rising. There will be more extensive use of automation in operation for protection of equipment and for increasing reliability. More large power plants will be coupled with chemical and industrial plants for joint economies.

For a 1-million-kw plant, using 2,800-lb throttle pressure, the total power required by the feed pump system will be some 38,000 hp, or 28 Mw of driver power. There could be a trend to turbine drivers for the larger feed pumps, or to the so-called shaft-driven pumps off the main turbines.

Bigger chemical plants and more chemically trained personnel will handle pollution problems and produce the high-quality feed water needed. In the nuclear plants, structures protecting the reactor will continue to be built under restrictive codes, but otherwise the station will follow the characteristics of the usual thermal unit. Many stations may have to be situated where water storage facilities—wells, cooling ponds, and cooling towers—will be necessary.

By 1975 installed hydro capacity could be between 52 and 55-million kw. Peaking hydro resources will become more usable as system loads and pooled operations increase. More distant and more costly sites will become economic. Pumped storage will often be the practical way of obtaining peaking resources.

The nuclear plant can be fitted nicely into a joint scheme with a pumped-storage hydro project. The first would carry the base load; the latter, the peak. The expected low-fuel cost of nuclear plants should make this even more attractive.

By 1975 hydro turbine capacities could run as high as 200 Mw for heads exceeding 250 ft. Economies will come with thinner arch dams, less steel in conduits through the use of high-tensile-strength steel, and the assignment of up to 70% of the water pressure to rock in tunnels lined with steel.

Transmission Voltage to Rise

Transmission lines will be at 230 and 345 kv and at one, possibly two, higher voltages in the range of 400 to 500 kv. Power to be transmitted will be so large that maximum utilization of rights-of-way will be essential. Double-circuit lines will be general. But double-circuit towers will not look quite like conventional designs today.

Each circuit will be in more of a triangular configuration on each side of the tower, supported from two instead of three crossarms. The configuration will give better performance and cost less. High-strength steel will be used more in tower members such as the legs. Greater use will be made of aluminum-alloy conductors, and bundling of conductors will be general.

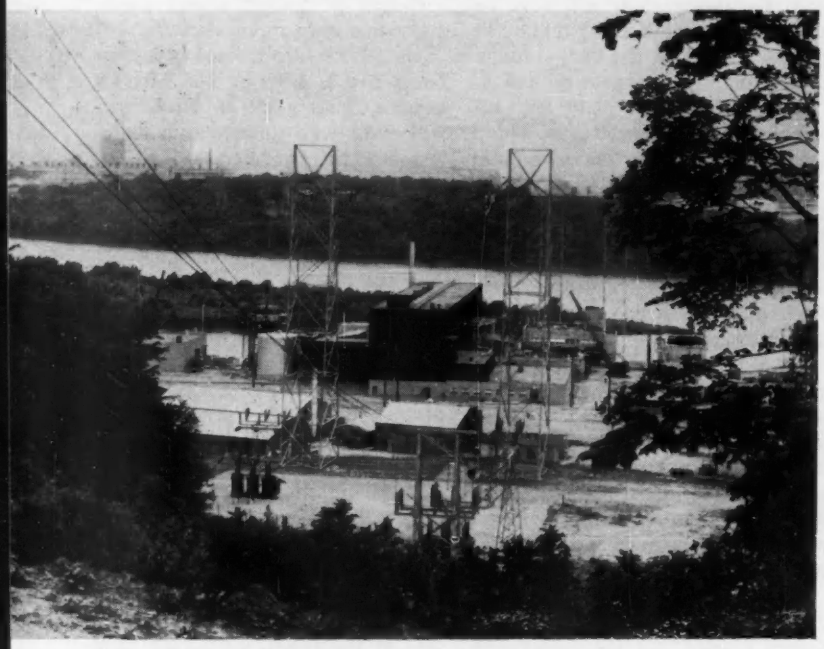
On such lines service reliability will at least equal that on today's lines. Loss of 1,000,000 kw line will be covered by reserves of the large interconnected network. Today's transmission facilities will be simply overlaid with the higher-voltage bulk power channels.

The 1975 power systems will be largely, if not entirely, automatic; they will be continuously operated by means of special-purpose computer-controllers in central dispatching offices. They will generate power at the lowest delivered costs, and the computer-controller will do the load dispatching automatically.

Thus, the trend to larger-sized generating units and higher-voltage transmission lines, augmented by sound management, will continue.

By 1975 the 410-million kw of capacity in the nation's power plants together with the additional extra-high-voltage transmission lines will provide the most economic power system of any nation.

Shippingport Opens Door to Atomic



SHIPPINGPORT, PA., first full-scale atomic-electric power plant serving civilian needs exclusively, is shown as it appears to the photographer looking north. Duquesne Light Co is building the conventional portion of the plant and will operate the entire plant. Pressurized water reactor is used

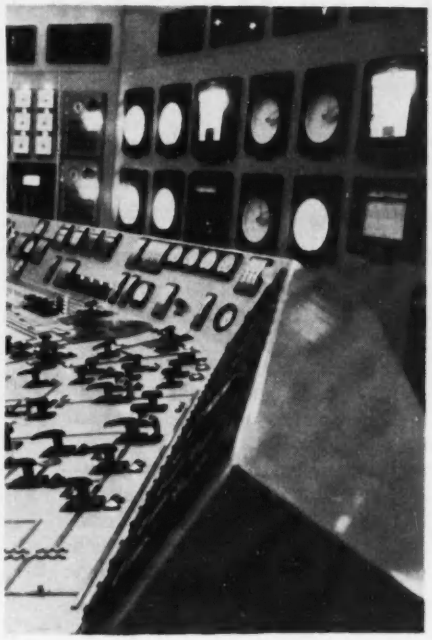
CONTROL ROOM is the center of operations for the world's first full-scale atomic-electric generating station supplying civilian needs exclusively

TECHNICIAN G. D. SHOPE removes protective covering from natural uranium fuel elements before placing them in nuclear core. He is assigned to the nuclear core dept., Bettis plant

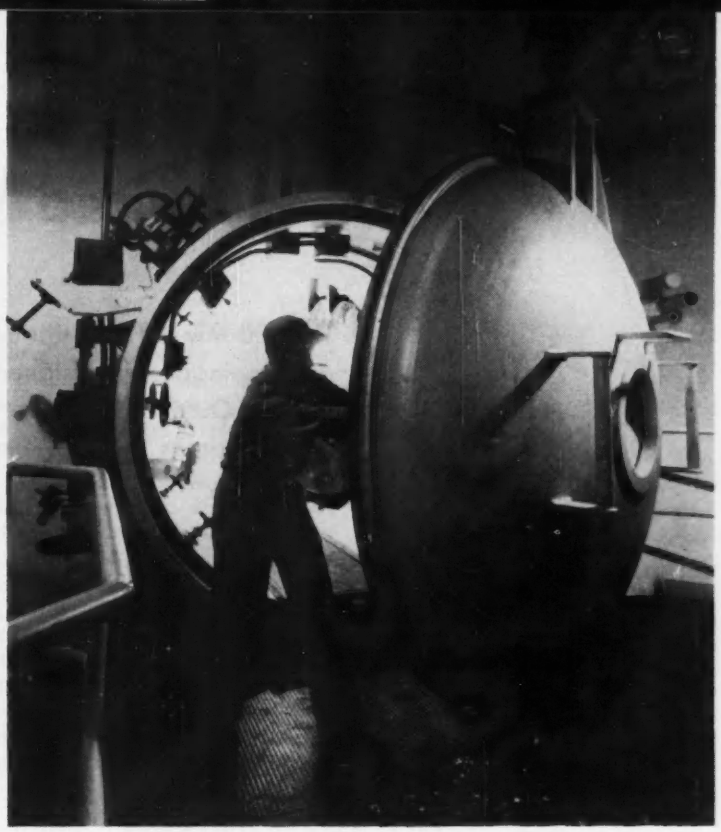
ONE of 145 fuel elements is inspected by Westinghouse Technicians Bash and Shope before insertion in the nuclear core, or the fuel charge. There are 113 blanket and 32 seed elements

FUEL ELEMENT (one of 113) is lowered into position through grid plate in the nuclear core. Special white overalls, protective shoes and gloves must be worn by the men

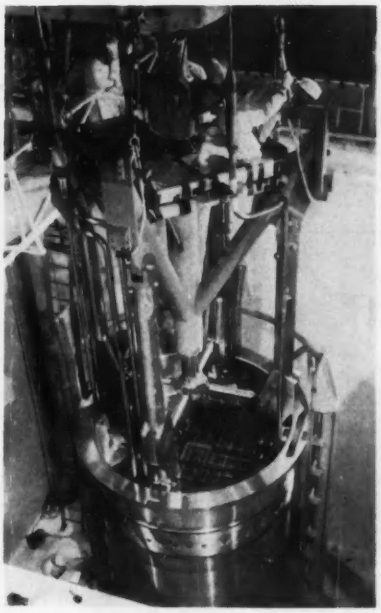
Power



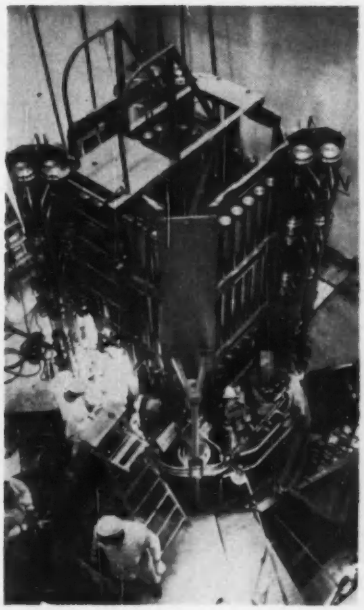
All instructions to the reactor, its associated equipment, and turbine-generator are issued by three operators sitting at this large consol panel



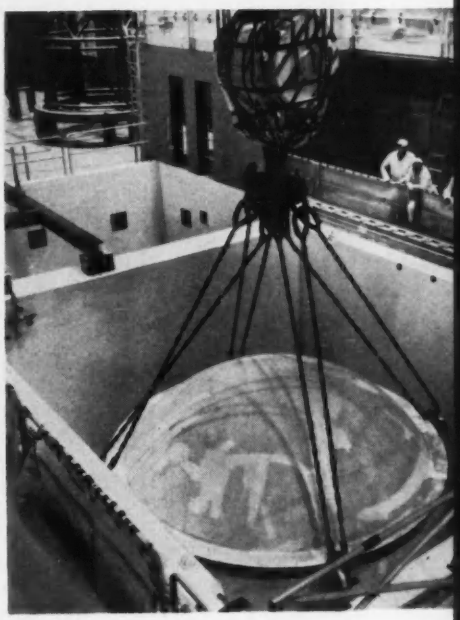
TWO-TON DOOR when swung shut seals off the auxiliary chamber of the generating plant from the rest of the facility. Inside the chamber is large portion of some 100,000 ft of piping necessary for transferring energy from nuclear chain reactor to turbine-generator. There are two such doors



FINAL STAGE of the job shows Westinghouse Electric Corp, Duquesne Light engineers and technicians attending lowering of core into special steel pressure vessel



TRELLIS atop reactor supports nuclear instrumentation and control rod drive mechanisms. The long cylinders on each side of the trellis are the 32 control rod position indicators



60-TON carbon steel dome is lowered to fit the top of nuclear reactor. This dome has an outside diameter of 19 ft 7 in. and the bottom of flange and the walls have 1½-in. thickness

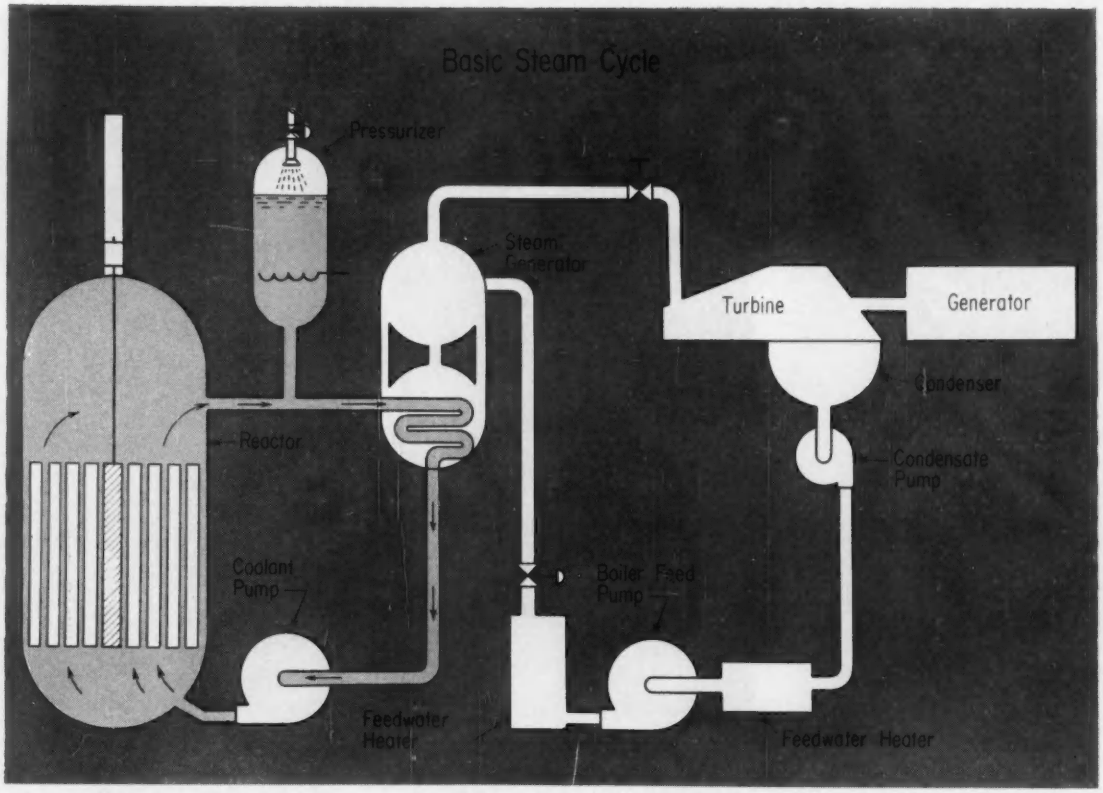
Pressurized Water Reactor

The 100-Mw (60 Mw initially) pressurized water reactor plant at Shippingport is designed to accept share of system load swings. Output of the reactor will follow all but the largest load changes without immediate control-rod movement

The Shippingport nuclear power plant, using a pressurized water reactor, will operate as far as practicable as a conventional plant. This is true despite the unconventional heat source and the elaborate testing that will be performed.

The station is designed to accept its share of load swings as required by system regulation. The output of the nuclear reactor will follow all but the largest load changes without immediate control-rod movement. Its inherent negative temperature coefficient assists the reactor in following these load swings. This nuclear feature permits the reactor to produce only that power which is taken from it.

There are, of course, many differences between this nuclear plant and conventional fossil fuel-fired plants. Some of these differences which affect the operation of the Shipping-



BASIC STEAM CYCLE at Duquesne Light Co's Shippingport Power Station has a primary coolant and a secondary steam loop, the latter being designed to dump most of system steam for a sudden, complete loss of electrical load

to Operate Conventionally

port nuclear power plant are:

1. Two loop systems are required in the steam producing portion of the plant; the primary coolant loops and the secondary steam loops.

2. The secondary steam loop must be designed to dump most of the steam in the system should there be a sudden and complete loss of electrical load.

3. An elaborate electrical auxiliary power system is needed, because of the requirements of the reactor.

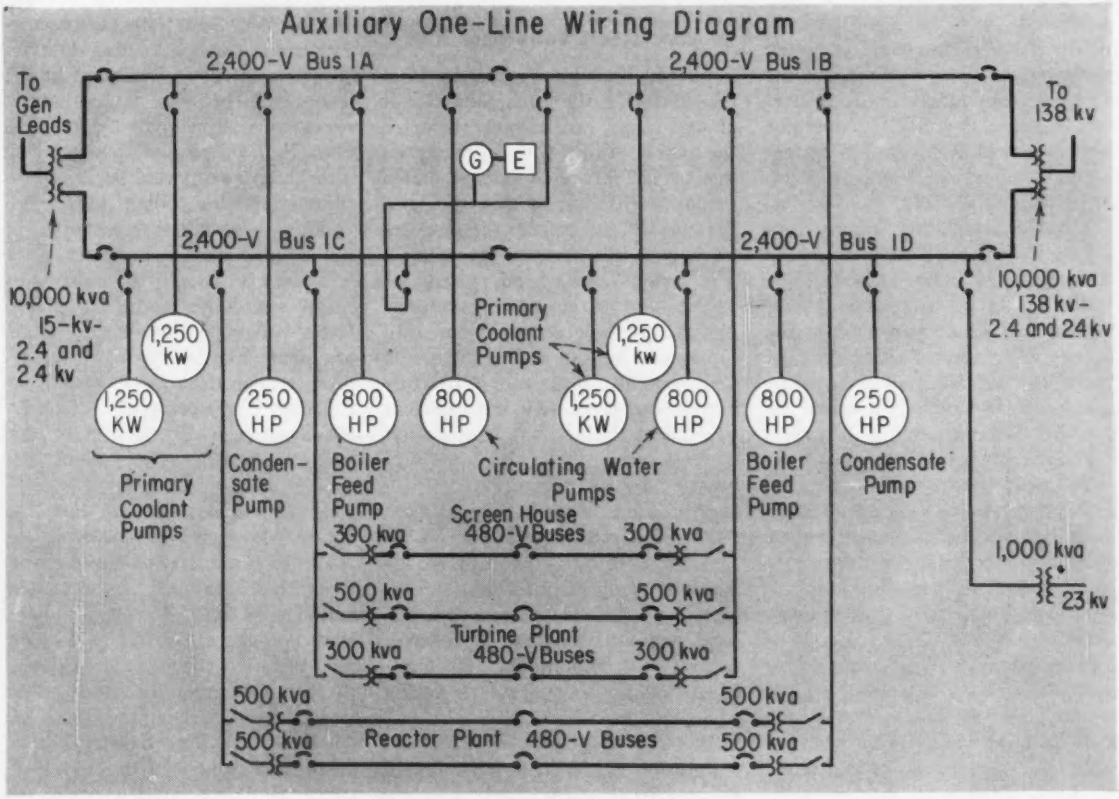
In the pressurized water reactor at Shippingport the coolant is circulated in closed loops from the coolant pumps to the reactor, through the reactor to the heat exchange sections of the steam generators, and then back to the suction of the pumps. A pressurizer equipped with electric immersion heaters maintains coolant pressure at a value that will prevent boiling in the reactor core. A spray nozzle, supplied with water from the discharge of the coolant pumps, is provided at the top of the pressurizer to assist in controlling surges during load changes.

Steam collected in the drums of the steam generators flows to the turbine and expands through the turbine to the condenser. Condensate is returned to the suction of boiler feed pumps through the normal array of coolers and feedwater heaters.

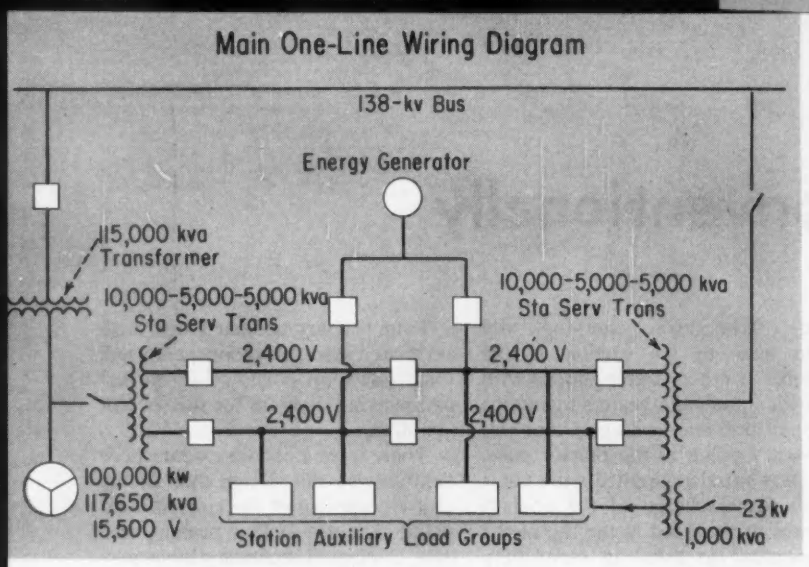
Four primary coolant loops, with associated secondary loops, are used. Only one loop is shown in the accompanying diagram for the sake of simplicity.

There is, to a certain extent, more flexibility in this design than in the unit-type design of the conventional plant. The use of four primary and their associated secondary loops permits the plant to continue carrying load should any of the loops or their components fail. In fact, full load (60 Mw) can be carried by any three loops.

The station operator can seal off any primary loop by closing, remotely from the control room, hy-



AUXILIARY SYSTEM'S total anticipated demand at full load is 9,800 kva with 2,100 kva served at 480 v. Largest loads in reactor plant are four main coolant pumps requiring approximately 1,250 kw each for full-load operation



FOUR INDEPENDENT SOURCES provide power for the station auxiliaries. Normal supplies are the generator and 138-kv system. A diesel-driven motor-generator set and a limited capacity 23-kv tie provide power for emergencies

draulically-operated valves in the reactor primary lines.

If a defective primary loop is taken out of service the secondary-loop steam pressure at the oulet of the steam drum will drop and an associated check valve will close in the discharge piping to the common boiler header. This will remove the affected steam generator from service. In actual practice the operator in the control room would immediately close a valve in the steam (boiler discharge) line.

Trouble originating in any secondary loop is handled in much the same fashion. The loop can be isolated from the system, and load will be retained or reduced according to the number of loops remaining in service. Normally, the associated primary loop also would be removed from service.

The reactor is designed to accommodate the maximum possible turbine-generator load swing. Under manual operation this load can be varied at 3 Mw per sec. Under automatic system load programming a 24-Mw-per-min swing can be accommodated.

Fluctuations in the steam cycle, such as a rapid load variation caused by changing system conditions, will be reflected back into the primary loops. But the volume of water flowing through the loops and the self-correcting feature of the reactor will cause its power level to vary in the corrective direction with little control-rod motion necessary except in cases of complete loss of load. As already indicated the pressurizer assists in controlling surges during load changes.

Reactor is Self Correcting

Should load be increased within the limits of the acceptable load-change range, heat removal from all the steam drums will be increased due to the increased turbine steam demand. Because of this, the temperature of the primary coolant returning to the reactor is reduced. The power level of the reactor increases due to the greater moderating effect of the cooler water until the reactor output equals the steam load demand. If the rate of reactor-power-level increase is not sufficient to prevent the coolant temperature from dropping below a reference point, the reactor control rods will be regulated automatically to limit the surge in coolant temperature.

A decrease in load causes the reactor coolant temperature to increase. The reactor power (neutron) level will immediately fall because the warmer coolant has less modulating effect. No control-rod action will be necessary unless the rate of reactor power decrease is insufficient to prevent a coolant temperature rise above a predetermined reference point.

Special provisions are needed for the steam in the secondary loop in case of a complete loss of load. If the generator should lose all load, 80% of the steam supplied by the steam generator must be exhausted in a sequential manner to the atmosphere outside the turbine plant. To accomplish this four dump valves open in succession based on the rate of load decrease. After a set time delay, to allow the reactor to reduce power level and commence load restoration, the valves close in sequence. This controlled steam relief system prevents extreme coolant system volume surges and operation of system relief valves.

Loss of the steam in the secondary loop will cause a temperature rise in the primary loop. This in turn, because of the negative temperature coefficient of the reactor, would result in a decreased moderating effect on the fast neutrons in the reactor core. Less fissioning would take place and the reactor power level would decrease and thus return the coolant temperature to normal. Control rods would be inserted only if the inherent temperature corrective factor were not sufficient.

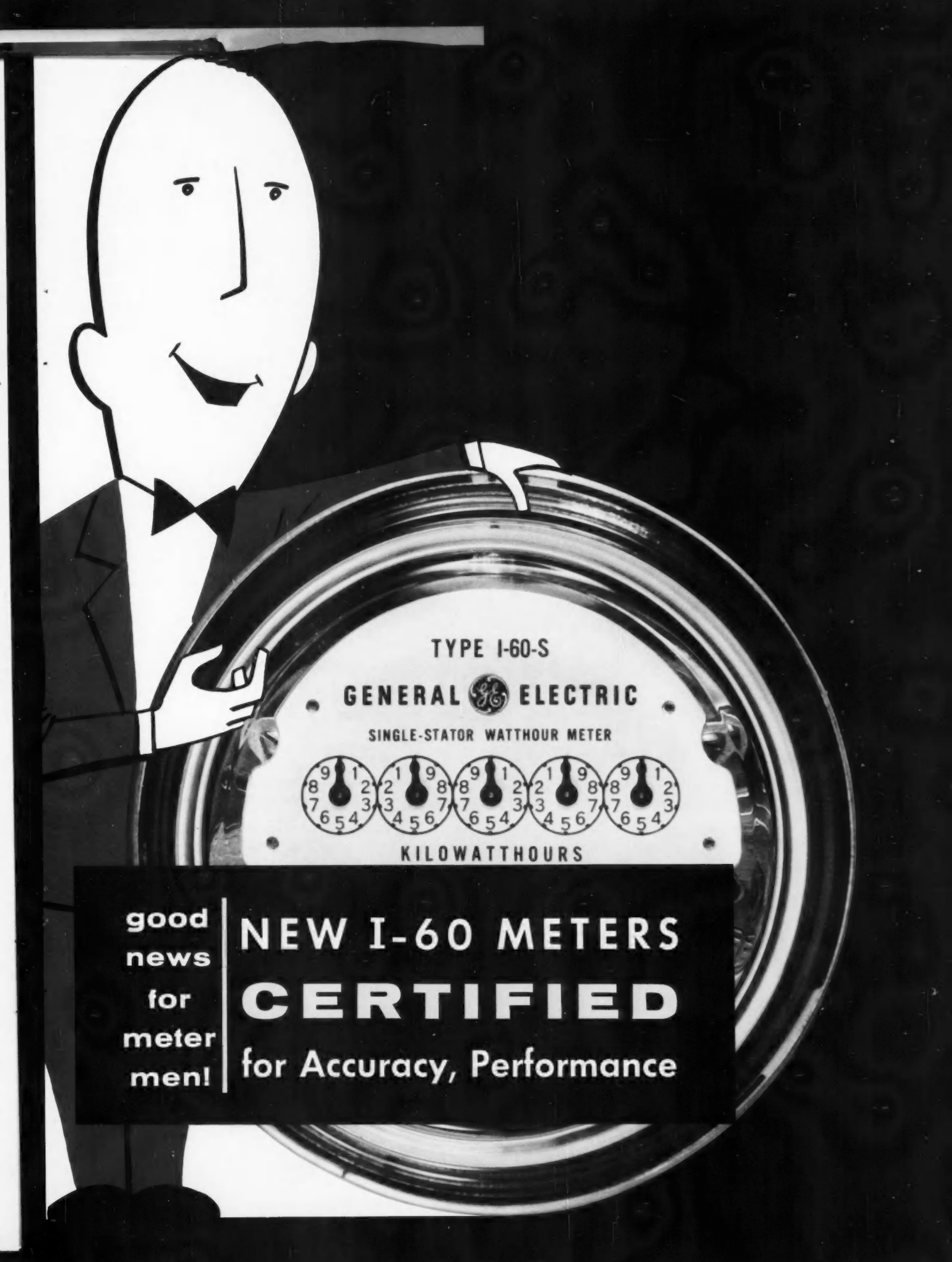
There is no control tie between the turbine and the reactor. But changes in turbine loading do affect reactor control as indicated above. The reactor control system makes necessary adjustments for these changes in the secondary steam loop after they are reflected back into the primary reactor coolant loop.

There is no pressure-sensitive signal to the reactor control system with the exception of a low-pressure safety shutdown (rod-drop) signal. Relief valve operation in the secondary steam loop is the high pressure protection in the coolant system.

Design and operation of the electrical auxiliary system differs considerably from practices found in a conventional fossil-fuel-fired plant. The accompanying one-line diagrams show the main parts of the electrical system. Four 2,400-v auxiliary buses are used. Two are normally fed from the generator main leads and two are normally fed from the 138-kv high-voltage bus.

Two additional sources of power were added to the station service system to provide for emergency operation. One source is a limited-capacity tie (1,000 kva) to the 23-kv line used for plant construction

(*Continued on page* 96)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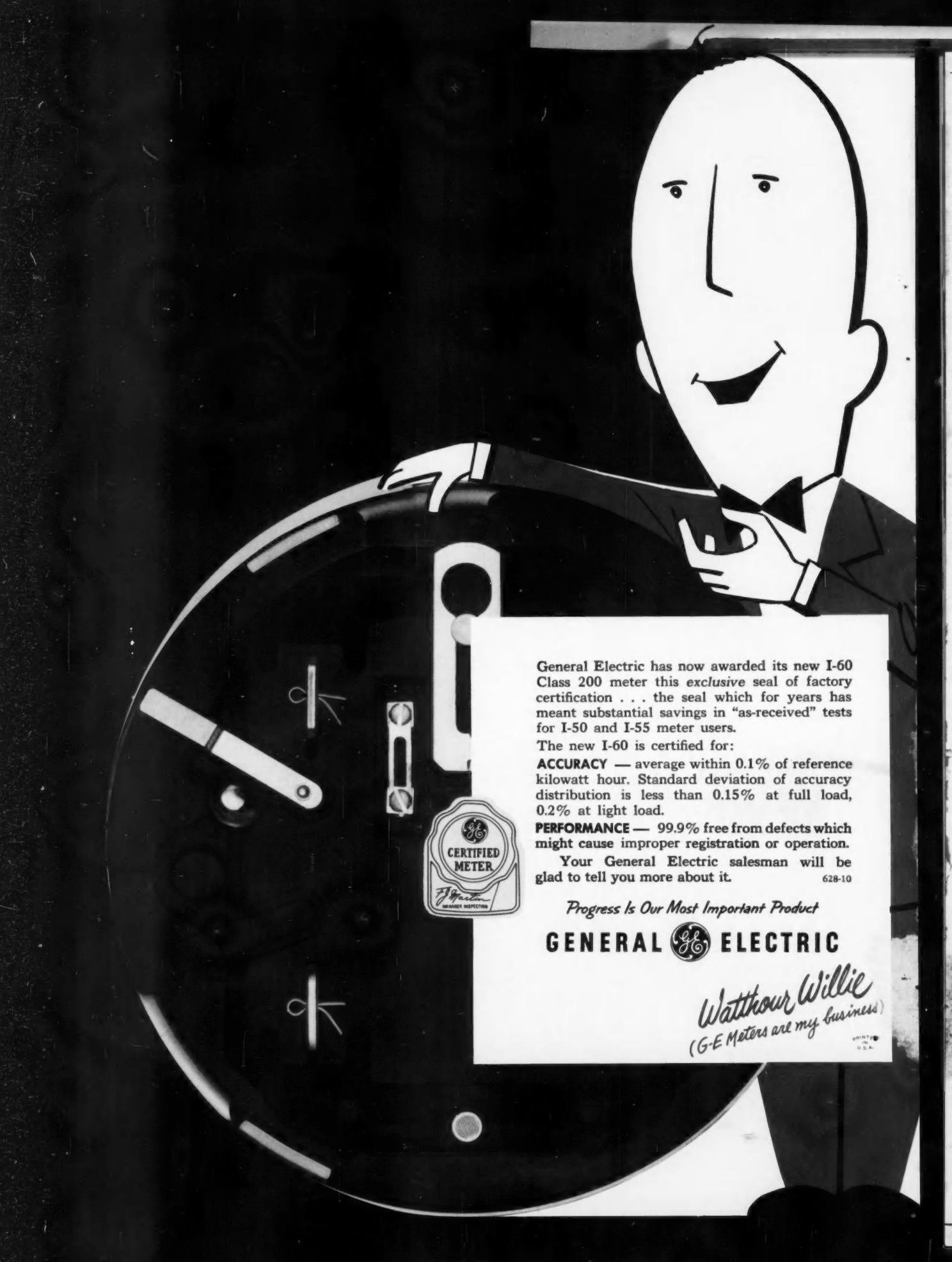

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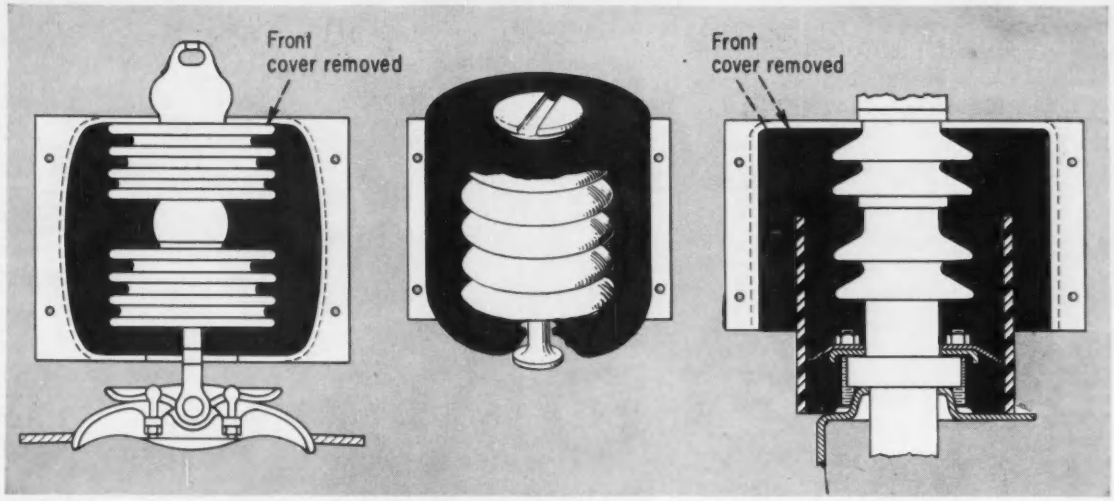


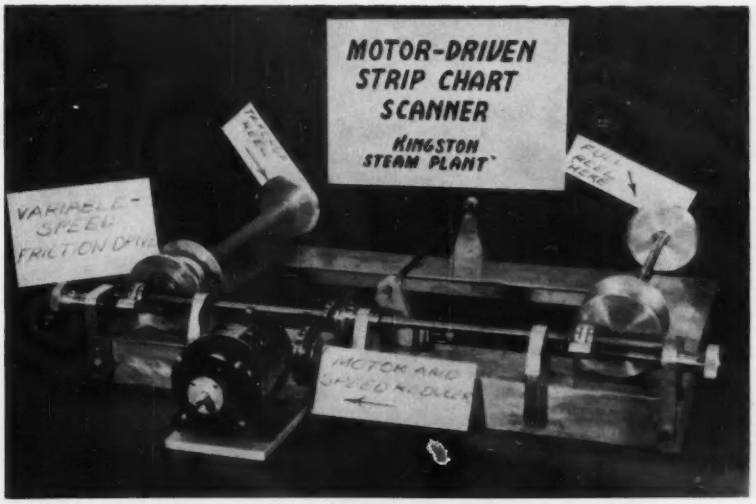
Plastic Shields for Insulators Stop Flashovers

C. M. WAGNER, Manager, Nueces Electric Cooperative, Robstown, Texas

Plastic shields tailored to fit around insulators are stopping salt spray and dirt contamination for Nueces Electric Cooperative. With insulators kept clean, insulator arcing has been stopped—a problem which cost Nueces $29,000 in 1955 in burned pole tops. Furthermore, the shields have stopped excessive circuit breaker operation by eliminating flashovers, of which there were 260 in one night.

Made of plexiglas and other types of plastics, the shields are sized and shaped to fit insulators to be covered. Basically the shields are two thin-walled half cylinders rounded at the top and/or bottom to follow the general insulator contour. Each half cylinder has two rectangular flanges which are joined after each half is fitted around the insulator.

Clearances are critical between insulator, shield, and hardware at ground potential; they were determined through study and experiment. These shields have performed satisfactorily for two years in a heavily contaminated atmosphere. Nueces now is working out plans for installing and removing shields with hot sticks. Patents on these shields are pending.



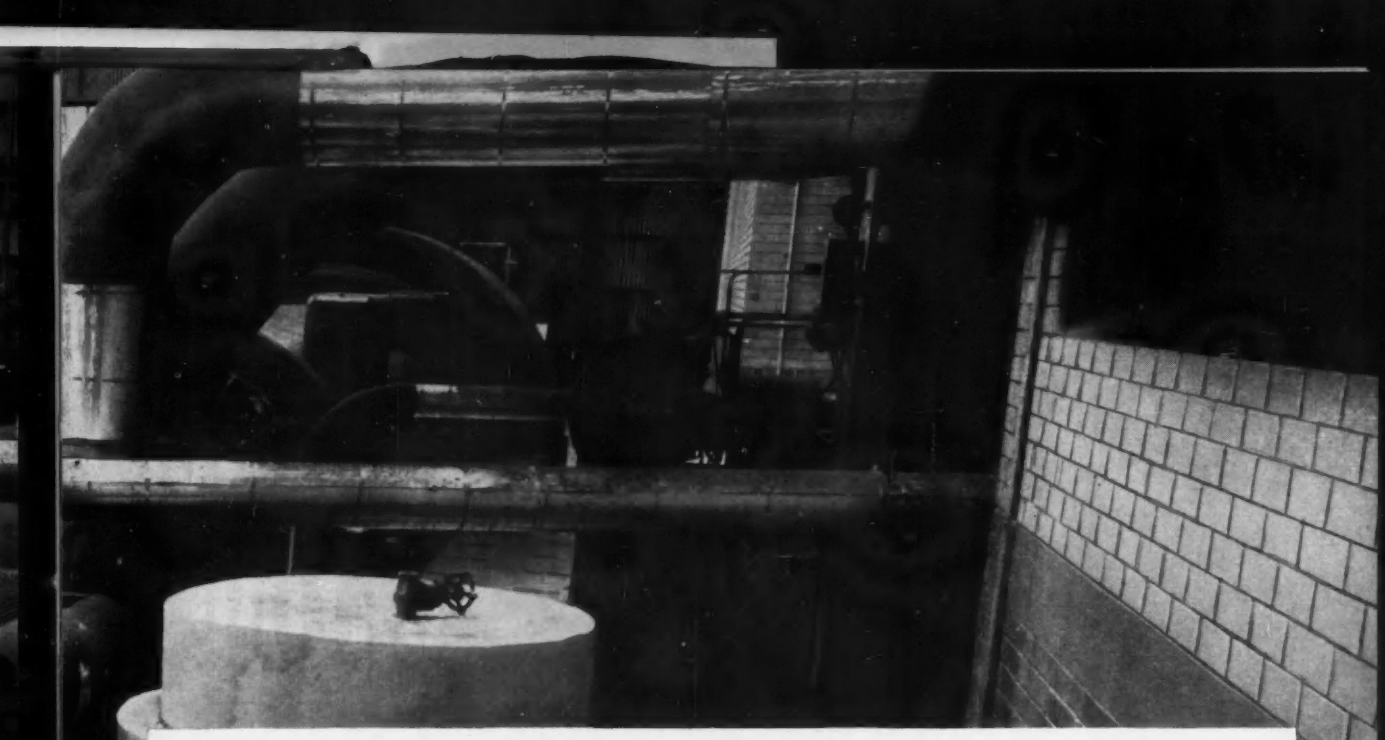
GENERATION—Operations

Strip-Chart Scanner Cuts Viewing Time

A motor-driven chart scanner has been developed by Tennessee Valley Authority personnel at Kingston Steam Plant. Scanning 120-ft roll charts with the device reduces the time required by 90% by eliminating hand rolling.

The scanner has a roller shaft at each end of a base to hold the charts and an idler roller in between. Both

(*Continued on page* 66)



General Electric boiler feed pump turbine

INCREASES PLANT CAPACITY 2%

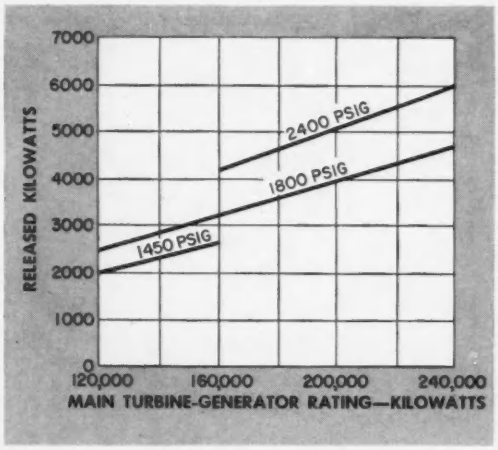
at AGE System's Glen Lyn plant

This G-E turbine driven boiler feed pump, in operation since May 1957, releases more saleable kilowatts for the Appalachian Electric Power Co. of the American Gas and Electric System.

The net output of the 225,000 kw Glen Lyn station unit number 6, operating on a 2000 psi reheat cycle, was increased by two per cent with the elimination of electric power requirements for the boiler feed pump drive.

Customer confidence in the reliability of G-E mechanical drive turbines is demonstrated by the selection of such equipment for this important application. This boiler feed pump drive turbine helps furnish profitable power for the equipment of the generating system.

Ask your nearby G-E Apparatus Sales Office about the dependability of General Electric turbine drives for your boiler feed pumps—or write Section 241-12, General Electric Co., Schenectady 5, N. Y.

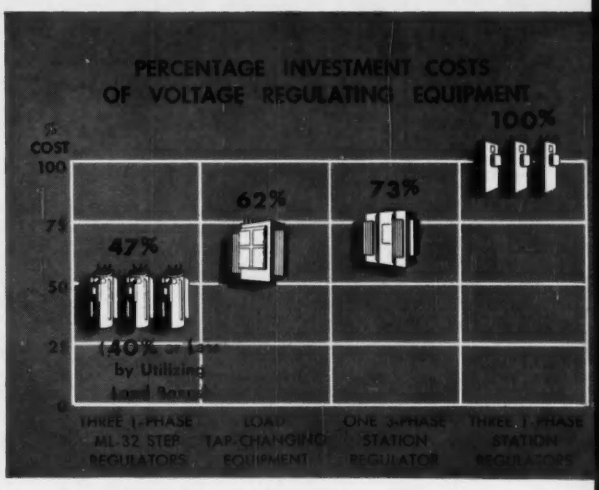


SALEABLE KILOWATTS are released by the elimination of electric power needs with G-E high-speed turbines for boiler feed pump drives.

Progress Is Our Most Important Product

GENERAL ELECTRIC

New Higher Ratings make...



COMPARE THE COST figures on the chart above and see how the application of ML-32 single-phase regulators can reduce substation regulation cost by as much as 60% compared to other types of regulation.

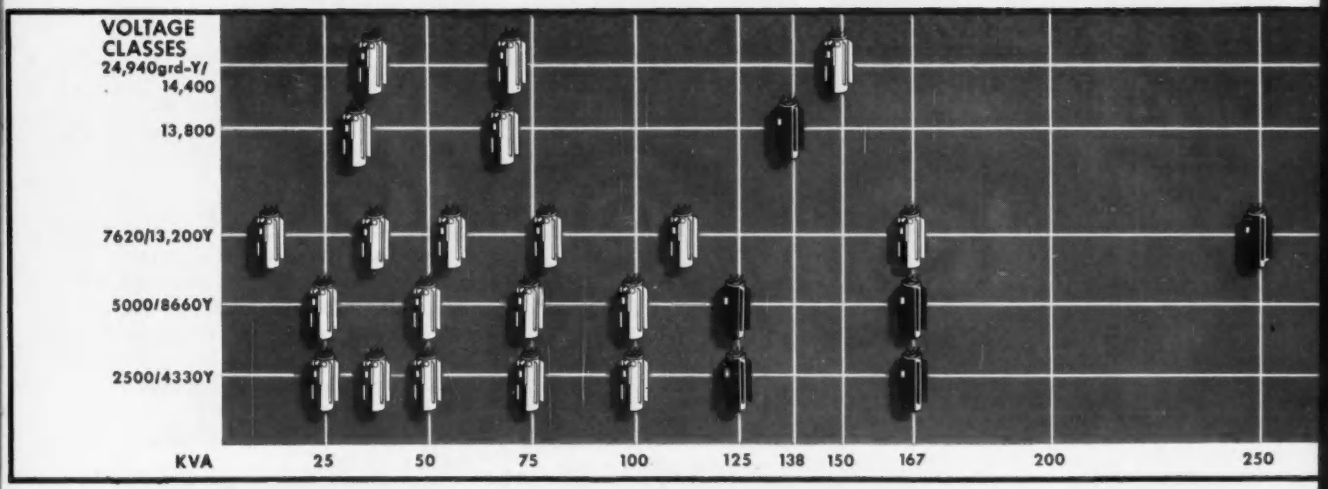
New ratings of G-E single-phase step regulators permit application of ML32's in larger substations . . . Save up to 60% of the cost of station regulation equipment!

The trend is to greater use of low-cost single-phase regulators in substations, and General Electric is meeting the demand. The new extended single-phase step regulator line provides new 125- and 167-kva ratings in the 2500- and 5000-volt classes, a new 250-kva rating in the 7620-volt class, and a new 138-kva rating in the 13,800-volt class for greater substation economies. As much as 60% can be saved on your regulation investment, and you also get individual phase regulation and increased savings through deferred investment in line rebuilding.

In addition, at reduced regulation ranges, a new Load Bonus (extra current capacity) of ***480 amperes*** (up to 160% of rated current) is now available on 2500-volt units rated 75 and 100 kva.

Remember, the price of substation regulation, using ML-32's, is less than that of other types of regulation. You'll want to know more about the quality and economy available in the ML-32; write to Section 423-25, General Electric Company, Schenectady, N. Y., or contact your nearest General Electric Apparatus Sales Office.

General Electric Regulators Cost Less On The Line

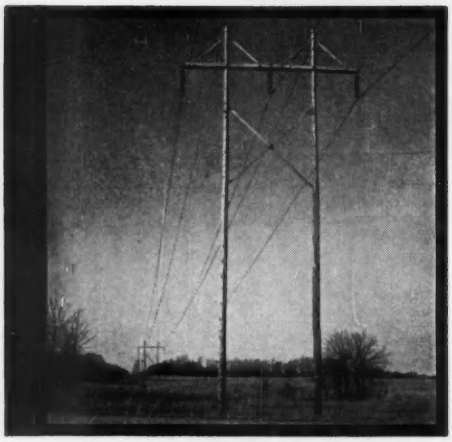


THE EXTENSION OF ML-32 RATINGS to 250 kva (new ratings shown above in black) gives you a new opportunity to provide low-cost regulation on your growing feeders. Growing load, plus demands for economy, can be met when you specify ML-32's for your substation regulation. They cost you less on the line.

Progress Is Our Most Important Product

GENERAL ELECTRIC

GALVANIZED STEEL STRAND

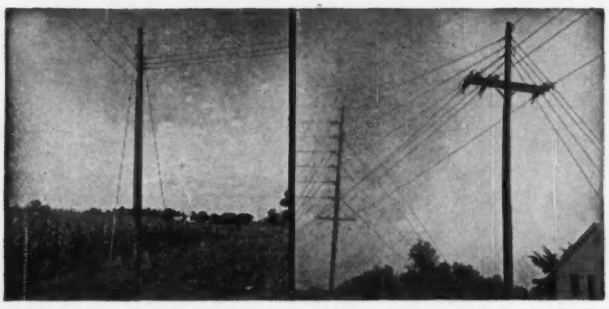


YOUR ASSURANCE OF HIGH QUALITY, LONG LIFE AND LOW COST

Close laboratory control over each step in manufacture has established Crapo Galvanized Steel Strand as a product of highest quality and dependability. You benefit through longer service life and lower ultimate costs.

Heavy, uniform, tightly-bonded coatings of commercially pure zinc, applied by the famous Crapo methods, withstand the punishment of construction, provide maximum resistance to corrosion and contribute to over-all economies.

For OVERHEAD GROUND WIRE . . .
CRAPO Weldless Galvanized Steel Strand



The most practical and economical strand for shielding transmission lines against lightning. Maximum strength and high fatigue endurance, inherent in Crapo Weldless Strand, provide that extra safety factor so important in overhead ground or static wire.

For GUYS and MESSENGER . . .
Crapo Galvanized Steel Strand. Made to highest standard specifications . . . a size and breaking strength to meet all practical needs.

Contact your jobber or write for descriptive folder.

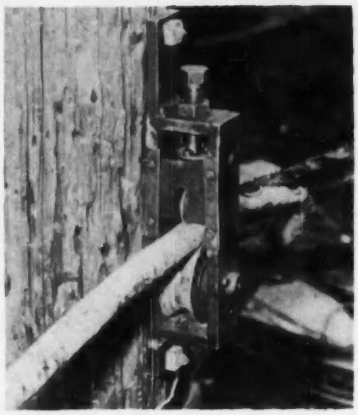
INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

Cuts Viewing Time

(*Continued from page* 61)

shafts are driven by friction disks through a pulley shaft linked to a 1/80-hp reversible motor. Friction disks at each shaft can be positioned independently to provide variable speeds and to keep the chart taut during scanning or rewinding.

DISTRIBUTION—Maintenance



LEAD STRIPPER cuts sheath to proper depth as cable is pulled through the stripping device with a power winch

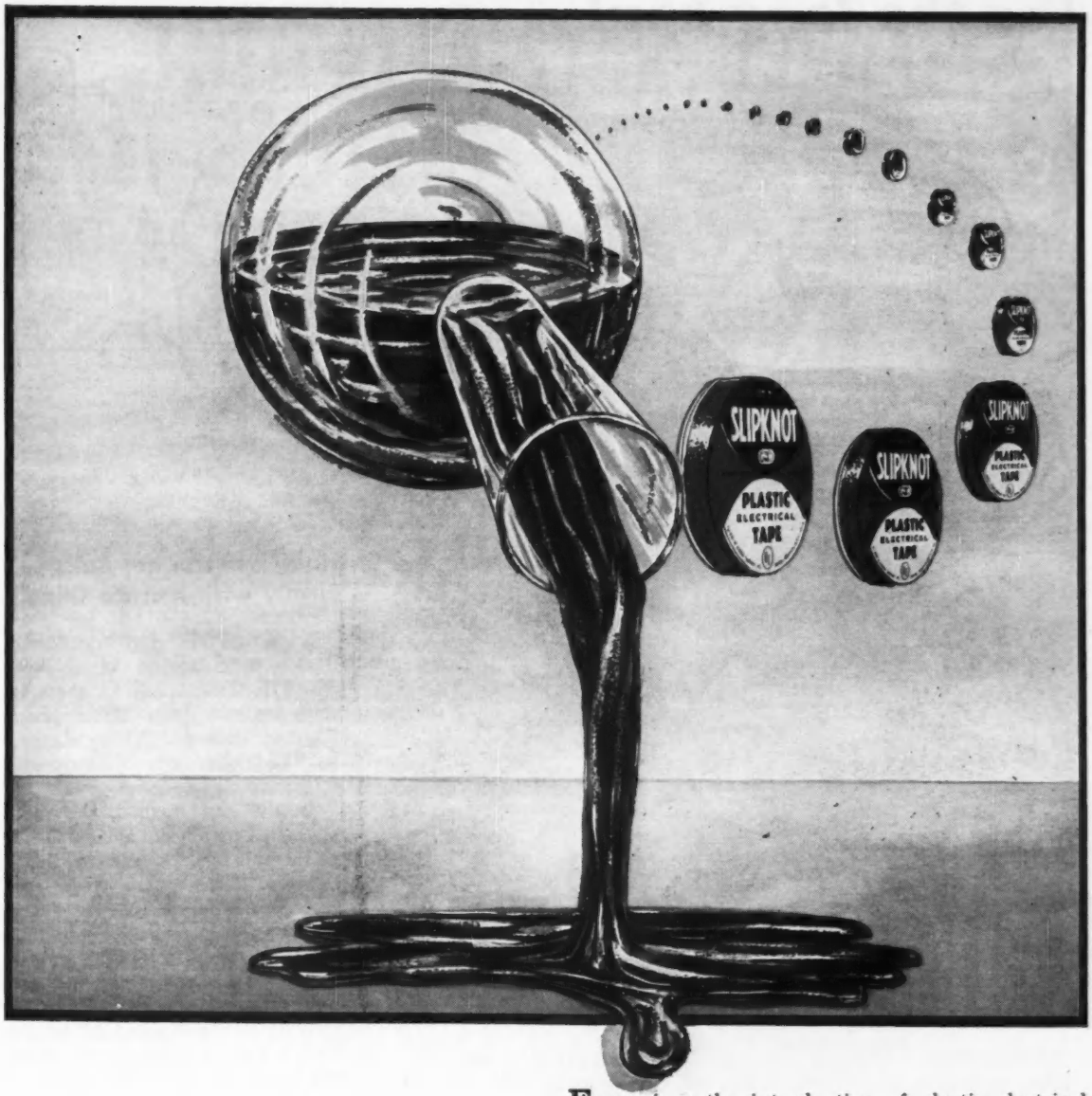
Lead Stripper Cuts Salvage Time 90%

W. E. SMITH, Water, Light & Power Dept, City of Springfield, Springfield, Ill.

Man-hr required for stripping lead from cable were reduced by 90% on the Springfield, Ill., system through development of a simple cable stripper. With the device, two men can remove several thousand pounds of lead from cable in one day. The former hand operation required up to 10 days for the same amount of stripping. Salvaged lead is used for wiping bushings on transformers and for calking water mains and fire hydrants.

The simple stripping unit consists of a cutting wheel and separator. It is bolted to a pole in the storage yard. Reels of cable are set up and cable sheath is opened up for about 2 ft. The cutting wheel is set at proper depth for cutting the lead sheath and the cable is then pulled with a power winch.

(*More How To on page* 68)



ZF·90
MAKES THE DIFFERENCE

EVER since the introduction of plastic electrical tapes, a major problem has been to keep the tape from creeping, and the adhesive from stripping off the base. A plastic tape with imperfectly bonded adhesive means trouble, as your experience with ordinary plastic tapes may have shown.

Plymouth's research laboratories have solved this problem with ZF-90 — proven formula for *total adhesion* — molecular fusion of special adhesive to vinyl base — to produce SLIPKNOT #7 PLASTIC ELECTRICAL TAPE. It *molds totally* around any job. The adhesive *cannot* be separated from the base, and therefore *will not dry out.*

Once you try new SLIPKNOT #7, you'll *know* you can *depend* on it. *Specify* it from your distributor.

SOLD ONLY THRU RECOGNIZED WHOLESALERS

PLYMOUTH RUBBER COMPANY, INC.

Makers of SLIPKNOT FRICTION TAPE

DIVISION 19 — CANTON, MASSACHUSETTS

For the long haul

guy with

CF&I GALVANIZED STEEL STRAND

Stringing lines over woodlands or difficult terrain is an expensive initial operation. But maintainance, too, can be costly unless the guy and messenger wires have the strength to withstand severe storms and the corrosion-resistance to assure long, trouble-free service.

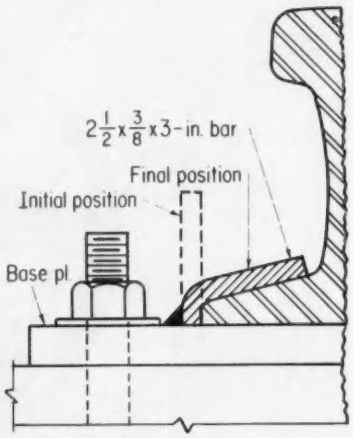
To meet these requirements, CF&I carefully controls every step in drawing, galvanizing and stranding its Galvanized Steel Strand. Extreme care in cleaning and galvanizing produces a heavy, tightly-bonded coating of pure zinc that provides maximum protection against corrosion. CF&I Strand meets or exceeds ASTM Specifications A-122 or A-363, or can be made to meet customer specifications in seven- and three-wire constructions.

Your nearest Electrical Wholesaler or CF&I representative will give you full details. Call him today.

CF&I GALVANIZED STEEL STRAND
THE COLORADO FUEL AND IRON CORPORATION

5800

Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Chicago • Denver • Detroit • El Paso Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Los Angeles • New Orleans • New York • Oakland • Oklahoma City Philadelphia • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Wichita



Sectional Elevation
(One half shown)

Hold Transformer Rails Firmly with Anchor Clips

Securing rails for transformer tracks with anchor clips saved 300% on labor costs for these installations at John Sevier Steam Plant of Tennessee Valley Authority. The anchor clips permit the rails to expand and contract freely.

In the new method, the mild-steel clips are aligned along one side of the rail position and welded to the base plates bolted to the concrete slab. After the rails are placed, the clips are welded to the base plates on the other side of the rail. Welds are made with mild-steel arc-welding rod. When all the clips are secured, they are heated and bent to form a bracket. Only one end of the rail is welded at the rail splice.

Eliminates Cracked Rails

Formerly, rails were installed by first aligning them on the plates and securing them temporarily. Then they were arc-welded directly to the plates using stainless steel welding rods. This method produced some cracks in the rails that had to be repaired by splicing in new sections.

The anchor-clip method also has been used to temporarily secure rails for a 60-ton construction crane. This application indicates the strength of the clips, as the crane created far greater stresses than are encountered in transformer installations. The new method also is recommended for installing turbine-room crane rails.

THE DELTA-STAR OVERALL SELF-PROTECTED TRANSFORMER*

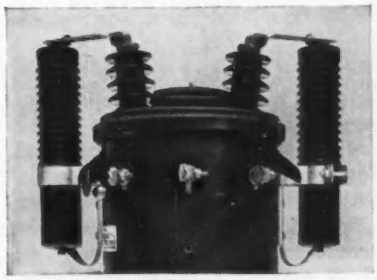
gives you the most modern features in transformer design

Delta-Star OVERALL SELF-PROTECTED Transformers are small in size, light in weight, and easy to install. Contributing to these advantages are a new Porter Core, smaller coil, improved insulation, corrosion-resistant tank, and high-strength shipping crate.

Delta-Star engineering has created an outstanding concept in OVERALL SELF-PROTECTED transformers. The most modern materials and methods have gone into the design. The reputation and experience of Delta-Star assures a quality product. In addition the transformer undergoes a series of rigid tests.

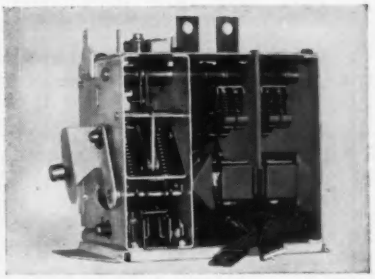
Send for illustrated catalog. You'll find complete information on this modern OVERALL SELF-PROTECTED transformer by writing *Delta-Star Electric Division, H. K. Porter Company, Inc., 17th and Cambria Streets, Philadelphia 32, Pa.* *. . . or to your nearest Delta-Star district office.*

***PATENTS APPLIED FOR**



Coordinated Crystal Valve Arresters. Have increased arc-suppressive ability and surge current carrying capacity.

Operating Handle. "Reset—Open—Closed—Light." Unique operating sequence prevents accidental tripping.



Circuit Breaker. "Plus" breakers, calibrated at the factory, offer maximum available overload capacity.

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Connors Steel, Delta-Star Electric, Disston, Forge & Fittings, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, H. K. Porter Company (Canada) Ltd.

Conductor Sizes for Grounding Equipment and for Buses

Ground Wire Size for Bus and Major Substation Equipment

Symmetrical RMS Amp, 3 Phase or 1 Phase to Ground	Copper Ground Conductor, AWG or Mcm — Ground Bus, Loop or Radial	Circuit Breaker, Transformer, Regulator, Capacitor Frame
Below 15 kv		
Below 5,000	2/0	2/0
5,000–12,000	2/0	4/0
12,000–25,000	4/0	2–4/0
Above 25,000	500 Mcm	2–500 Mcm
15 thru 34 kv		
Below 7,000	2/0	2/0
7,000–12,000	2/0	4/0
Above 12,000	4/0	2–4/0
34 thru 230 kv		
All	4/0	2–4/0

Ground Wire Size for Other Substation Equipment

Equipment to be Grounded	Ground Conductor, AWG Copper	Aluminum
Lightning arrester or supporting steel	2/0	4/0
Line coupling capacitor or supporting steel	2/0	4/0
Current transformer case or supporting steel	Same as for power transformers*	
Potential transformer case or supporting steel	Same as for power transformers*	
Station power transformer tank or supporting steel	Same as for power transformers*	
Steel switch structure	2/0	4/0
Structural steel on single wood pole structure	2/0	4/0
Structural steel on multipole wood structure	2–2/0	2–4/0
Transformer or regulator steel supporting stand	Same as for power transformers*	
Switch operating mechanism	2/0	4/0
Switch base on all wood structure	2/0	4/0
Fuse base on all wood structure	2/0	4/0
Fence	4	...
Yard lights	One size larger than supply leads	...
Oil storage tank	2/0	4/0
Outdoor battery, relay and meter cabinets	2/0	4/0
Steel switchboard panels	One size larger than supply leads but not larger than 4/0	
Instruments, meters and relays	12	...

* See above table for transformer or regulator grounding conductor.

A. H. THIERMANN, Jr., Substation Engineer, Virginia Electric & Power Co, Richmond, Va.

Ground conductor sizes are compiled for equipment in substations. The sizes are based on the following formula for determining the short-time current capacity of copper wire. Also considered are the allowances for probabilities of faults and the requirements of mechanical strength and standardization. In some cases, the nearest size wire normally stocked is the determining factor.

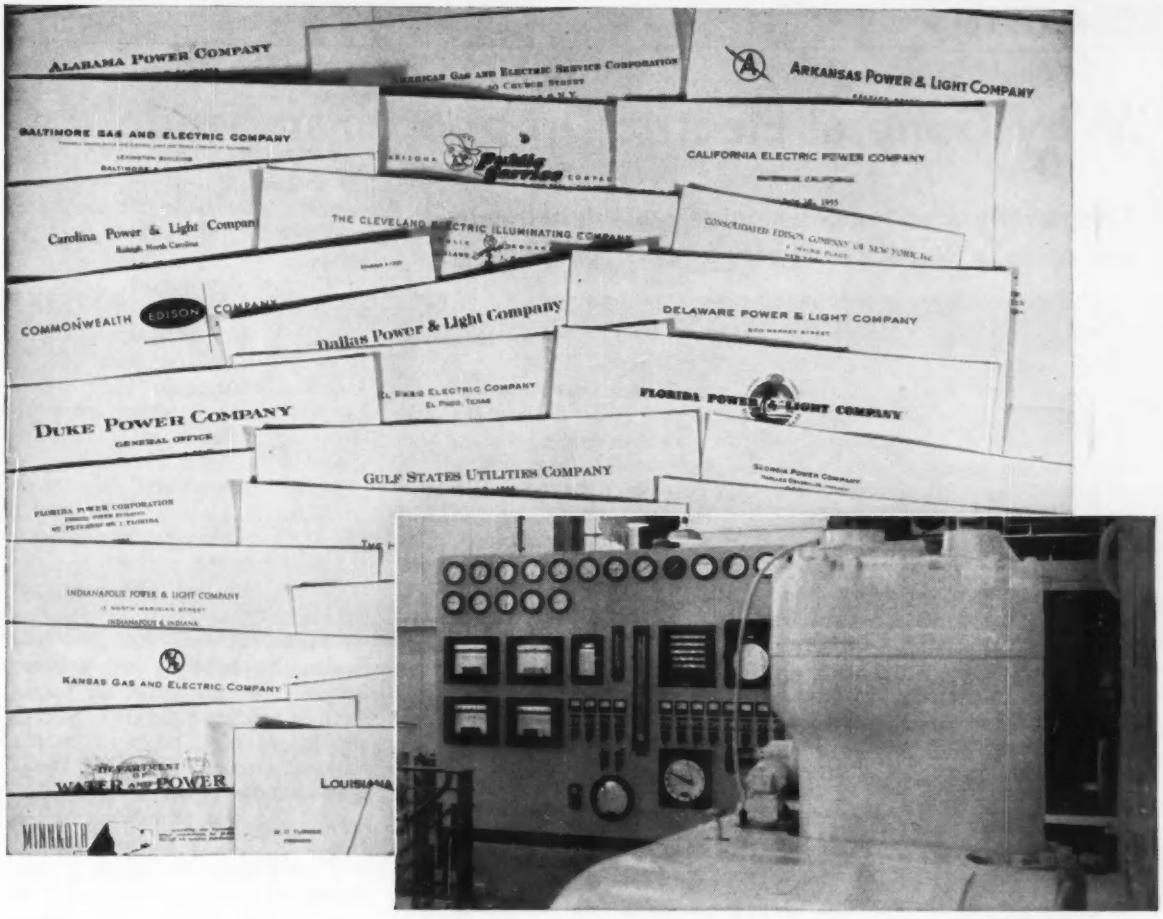
In applying the formula, time of fault current flow is assumed to be 3 sec with automatic equipment in service. Maximum permissible temperature is based on a rise of 250C for bolted joints and 450C for brazed joints.

$$A = \frac{I}{\sqrt{\frac{\log\left(\frac{t}{274}+1\right)}{33S}}}$$

where: A = copper cross section in circular mils
I = current in amperes
S = time in seconds that current is applied
t = temperature rise in degrees centigrade above ambient of 40 C

Fence: If tied to the station ground bus, use 2/0 copper conductor buried but not more than 2 or 3 ft from inside the fence and paralleling the entire fence. Use No. 4 solid or stranded copper wire for connections to the ground bus. They are to be made at every corner post, both gate posts, the posts on each side of every removable section, each end post at fence discontinuities due to buildings, etc., and at least every 75 ft along the run of the fence.

Chain link fences are grounded by a method outlined in a forthcoming Engineering Reference Sheet.



You're in good company

when you choose . . . Honeywell instrumentation

You join America's best-known public utilities in your choice of instrumentation by Honeywell. You'll find Honeywell controls everywhere . . . in large stations and small. The reasons for this are clear.

With the precision, stamina, and reliability of Honeywell instruments, you get an important extra . . . service. This service begins with your first plans, and continues long after your instruments are installed. It includes:

Application engineering of instrumentation, custom-fitted to your plant by a staff experienced in power station measurement and control.

Installation and startup assistance by Honeywell service engineers.

Maintenance engineering, in emergencies or on a periodic service schedule, by factory-trained specialists located near you . . . in the more than 112 Honeywell offices in the United States and Canada.

Quick shipment of spare parts, from your local Honeywell branch office or from the Parts Depot in Philadelphia.

Training of your instrument men in up-to-date maintenance methods at the tuition-free Honeywell Education and Training Center in Philadelphia.

These are but some of the benefits you gain when you add your company's name to the list of prominent companies using Honeywell instrumentation. Get the full story from your nearby Honeywell sales engineer. He's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Controls

Why General Electric Dropped 'Fair Trade'

Company cited two reasons: legal untenability of 'fair trade', and damage to competitive position of GE dealers

General Electric Co has abandoned its long-time "fair trade" policy on housewares and small appliances.

W. H. Sahloff, vice president in charge of the housewares and radio receiver division said recently in a letter to retailers that "fair trade" on these products had been given up.

(Under "fair trade", manufacturers fix a minimum legal retail price on branded products in states with laws enforcing the practice.

The question is "Why?"

GE, one of the foremost proponents of fair trade, reported two factors contributed most to its decision. Said Sahloff: "First is the adverse legal position of fair trade evident most recently in several key market areas. Court after court has expressed its lack of sympathy with fair trade and its disagreement with the legislative judgment which led to the passage of the fair trade laws.

"Secondly, dealers complying with our prices in fair trade states have been placed in an untenable competitive position when located next to non-fair trade areas, or located in states where it has become increasingly difficult to secure prompt injunctions or adequate penalties to enforce them. These obstacles, as well as the mail-order loopholes and other inconsistencies in the legal situation have made fair trade unworkable for the marketing of our products.

"Current experiences, based on our studies of the recent trend of the over 3,000 fair trade cases instituted by us in the past five years indicate it is impossible to uniformly establish and effectively protect our price structure in the manner contemplated by the fair trade laws."

In an exclusive statement to Electrical World, a GE spokesman emphasized that the decision to quit the fair trade camp meant that the company had not abandoned its belief in "fair trade" principles. Convinced of their merit, it told dealers that hope lay in a uniform Federal law rather than the patchwork of existing state laws. Such a statute has been prepared by the National Association of Retail Druggists—another powerful "fair trade" camp—and was introduced in the House by Oren D. Harris (D-Ark.).

The GE decision brings into focus the whole question of the legality of "fair trade." The states, under a Federal enabling act exempting manufacturers from anti-trust laws in this field of price-fixing, enact and administer "fair trade" laws. Even so, the going has been rough in some states. In 11 of them, high courts have thrown out these laws or made them unenforceable.

Sunbeam Follows Suit

As was expected, Sunbeam Corp, one of GE's principal competitors in this field, followed suit and dropped "fair trade" almost immediately. It notified its 12,000 dealers that it was abandoning the controversial policy on many products, but keeping it on others, particularly electrical gardening equipment. And it looks as though others will quit the "fair trade" camp, notably McGraw-Edison's Toastmaster Division. Said McG-E president Max McGraw: "We can't fight it." Westinghouse gave "fair trade" in 1955 as "unworkable."

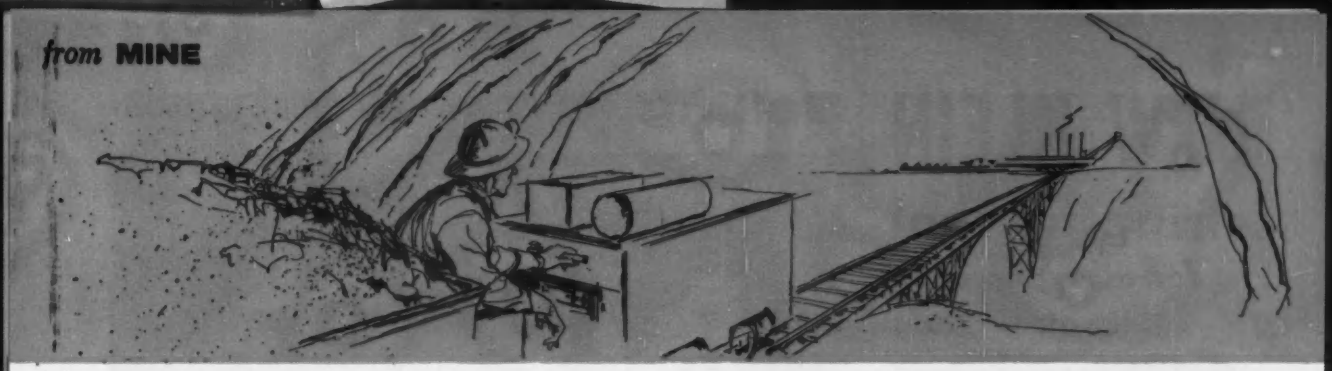
(*More Selling on page* 74)

Sign of the Times

National Electrical Week got a unique twist in New York City when Commissioner of Water Supply, Gas and Electricity Armand D'Angelo changed the street sign in Times Square, renaming it Electrical Square (only for the Week, of course).

The sign-switching ceremony was followed by a luncheon at which Mayor Robert F. Wagner addressed members from all branches of the city's electrical industry. He congratulated them on the job that industry has done to make NYC the town it is, and told them they must face an ever increasing demand to meet the electrical needs of the city's public.

from **MINE**



to **CIRCLE**

to **YOU**

ONE SURE SOURCE OF SUPPLY

for all your wire and cable needs

Quality products, ample stocks, dependable deliveries – that's what you get when you work through a Circle distributor.

Quality products – because Circle controls every step in manufacturing – from the copper, lead, and zinc mined and refined by Cerro de Pasco down to the finished wire and cable –

Ample stocks – because Circle is one of the country's largest producers with over a billion feet of quality building wire and cable rolling out of its huge plants yearly –

All-out service – because that's a basic policy at Circle, a policy which has earned Circle its reputation for giving fast, friendly, dependable service where and when it's needed.

Why don't *you* make a Circle distributor your "one sure source of supply." Many other satisfied customers do.

C W C **CIRCLE** **WIRE & CABLE**
a subsidiary of
CERRO DE PASCO CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** in all principal cities

RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

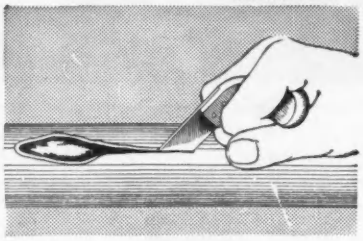
NEW KLEIN

stripping tool

for all types of control cable

Patents 2398979
2691822

Cat. No. 1558



Here is a new tool developed by Klein, designed to strip insulation from all types of control cable, flexible cords, PWC, telephone cable with vinyl or polyethylene jackets and bus drop.

Handle of cast aluminum, light in weight and with convenient grip; knife of tempered tool steel may be sharpened and is easily removed for replacement. This tool strips insulation from a few inches to as many feet as desired swiftly and simply. Does not damage conductors inside weatherproof sheath.

Write for bulletin giving complete information.

FREE POCKET TOOL GUIDE

100 years of service to linemen, electricians and industry is back of this new Pocket Tool Guide No. 100. A copy will be sent you on request without obligation.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp. New York

Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

ELECTRIC HEATING was the subject of a recent meeting held for utilities by Ebasco. Wiegand's W. G. Potter demonstrates electric school heating equipment

Ebasco Holds Heating School

Heating specialists from 14 electric utilities spent a week in New York recently being briefed on electric heating. The meeting, held by Ebasco Service's Sales & Public Relations Department, covered the space heating market, the latest techniques in heating requirements and heat loss calculations, and sales.

Teamed up with Ebasco staff men, acting as instructors, were some of the industry's equipment manufacturers, to wit:

Electromode's Director of Engineering Lowell Mast presented "Heat Loss in Everyday Language," a 90-min slide-presentation aimed at helping dealers and electrical contractors figure heat losses.

Designing electric heating installations can be simplified by using charts available from manufacturers, according to Stuart Forsyth, manager of **Westinghouses's** Electric Heating for Homes Department. Forsyth followed up his assertions by demonstrating some design methods using charts.

Picking up the commercial and industrial chapters of the electric heating story, **Wiegand's** Fred Kreiser put the emphasis on electric heating's suitability for schools, stores and manufacturing plants. He pointed out that schools can be cheaper to build and operate with electric heat (EW, Nov. 18, 1957, p100). Kreiser feels that contractors, architects and engineers—the people who have influence in school design—"should be presented with the facts about electric heating at special meetings arranged by utilities and manufacturers." (A practice followed, incidentally, by no less than 12 companies last year).

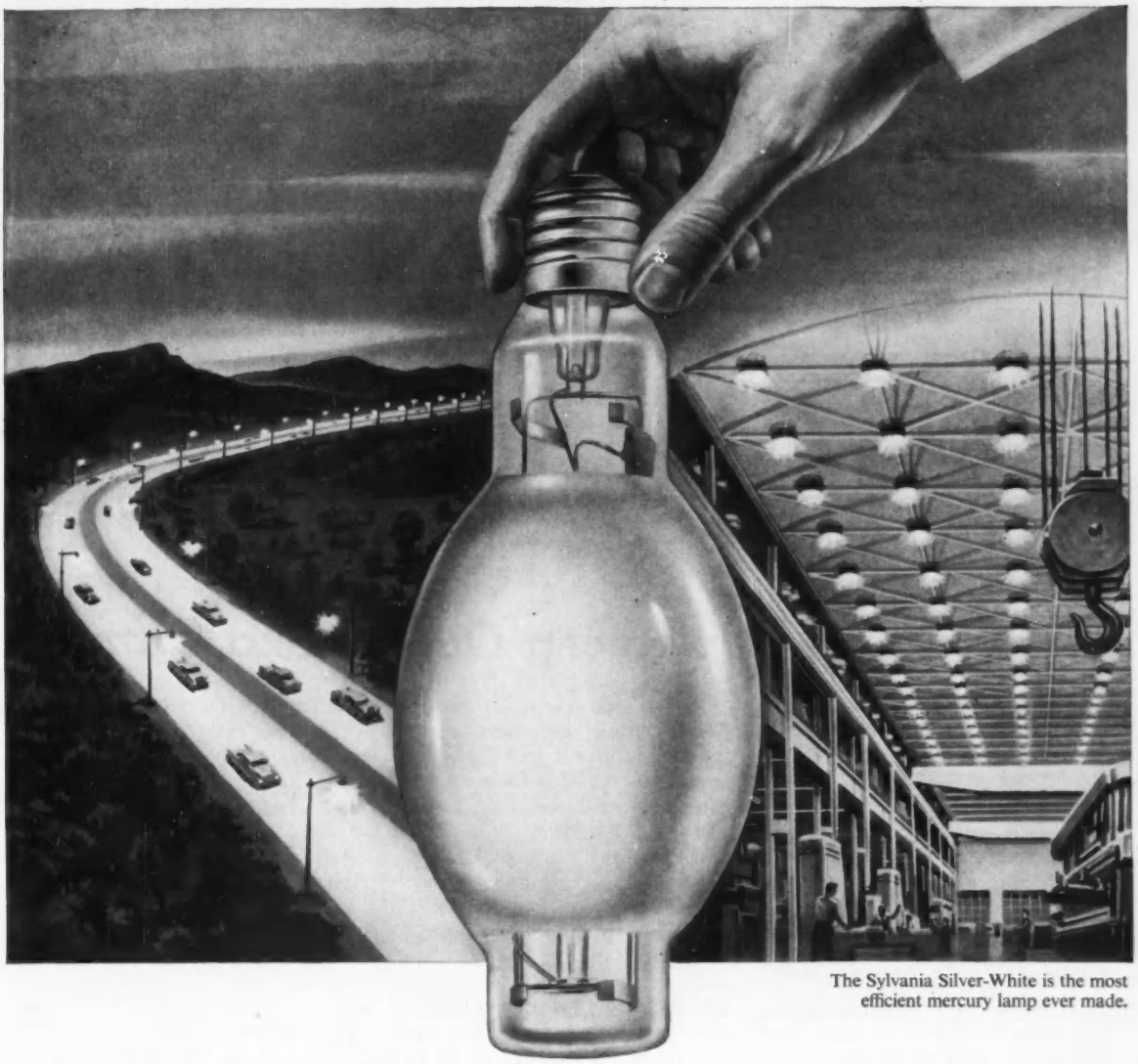
Berko general manager Stanley Aronson reminded utility listeners to push electric heating's efficiency compared to that of other fuel-fired systems. Estimated Aronson: "Hidden costs of fuel-fired systems, like higher installation costs, (costs of operating fans, value of occupied space, etc.) when amortized over the life of the system are equal to $86.00 a year on the average."

Utilitymen were also given a tour of **General Electric's** heat pump plant at Bloomfield, N. J. Weathertron Department contact man Paul O'Neill explained how heat pump makers compute requirements for supplementary resistance heating elements to keep demand on utility systems down.

School closed with a demonstration of new product for electric heating. Called "Lamitherm", it is made up of chemically-impregnated paper which conducts a current and becomes a heating device. Manufacturer claims it:

- Can be produced in quantity and in many shapes and sizes.
- In sheets can be fastened to plaster board, molded into cylinders, or formed into baseboards or corner mouldings; thus every square inch becomes a heater.

(*More Selling on p* 76)



The Sylvania Silver-White is the most efficient mercury lamp ever made.

For highway . . . or high-bay

. . . the one-lamp answer to both lighting needs

Today's most efficient mercury-vapor lamp is the new Sylvania Silver-White.

The greater light output and superior color quality of the Silver-White makes it an effective, versatile lighting source . . . it serves the high requirements for such widely different applications as highway lighting and high-bay plant illumination with unequalled efficiency.

Sylvania's Silver-White actually delivers up to 33% more lumens of light than previous color-improved mercury-vapor lamps. The 100-watt lamps, for example, are producing an unprecedented 4000 lumens in actual installations.

Sylvania Silver-White lamps cost no more than conventional color-improved lamps—but offer the combined economies of superior light output and superior construction.

Silver-White lamps are available in 100-, 175-, 400-, 700-, and 1000-watt types to meet the needs of industry for efficient high-bay indoor lighting and outdoor illumination for parking and loading areas . . . and for the governmental requirements for effective highway lighting.

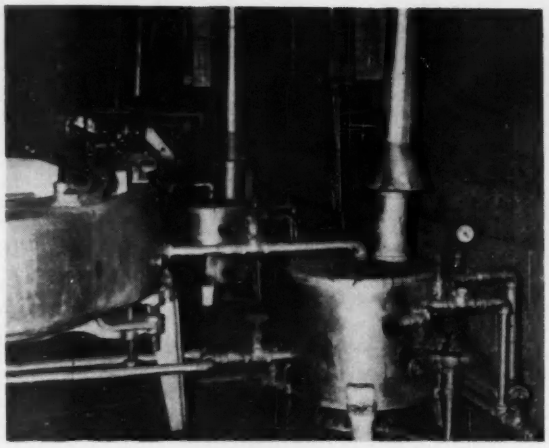
For complete information about the Sylvania Silver-White Mercury Vapor lamp, call your local representative, or write:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Dept. 8L-7603
60 Boston St., Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

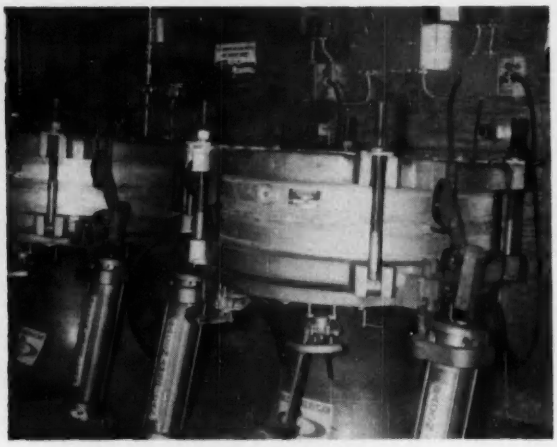
SYLVANIA

. . . the fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY



Replacing gas-fired tire molds . . .



with clean, modern equipment . . .

Electric Molds Up Recap Quality and Output

BRENT SHUNK and **DALE ANTHONY**, Power Sales Engineers, Pennsylvania Power & Light Co, Harrisburg, Pa.

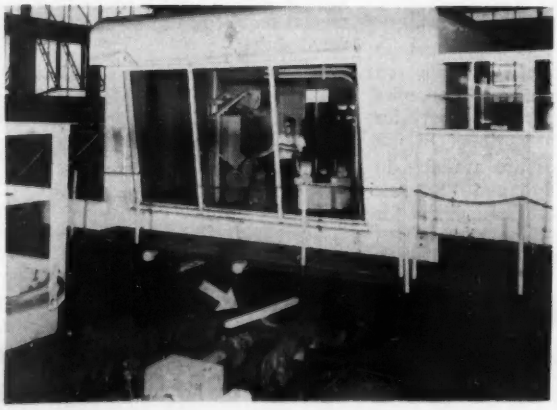
Better quality retreads, higher production, and better working conditions are the big benefits of a switch from steam to electric tire molds at Schneider & Young, Inc, a Harrisburg, Pa. recapping firm. Work is no longer affected by room temperature. Working areas are safer because pools of water formed by steam condensation have been eliminated. And the company is in a better competitive position.

In the conversion, all gas-fired, steam-operated equipment, comprising 5 truck molds and 3 passenger molds, was replaced. New electrical equipment includes two 1-phase, 115-v, 4.8-kw passenger molds and 20 240-v, 6-kw trucks molds.

Eliminating the 2-hr warm-up period required for the gas-fired equipment produced a significant savings in labor costs. With automatic control and a 15-min warm-up, electric molds are ready to go when employees report for work. The results: a capacity of 32 tires per day with two molds against 27 per day with three steam molds.

Another advantage is a superior vulcanizing job. Twenty-six lb of cold rubber begins to flow in 11 min. Temperature varies only 3 to 5 degrees in a range of 295 to 300 F. With accurate heat all around the mold circumference, unavoidable changes in room temperature no longer cause uneven heating and weaknesses where new rubber joins the old. Owners and employees now enjoy normal room temperatures, compared to temperatures of 120 F previously and the fumes from the open gas flame are gone.

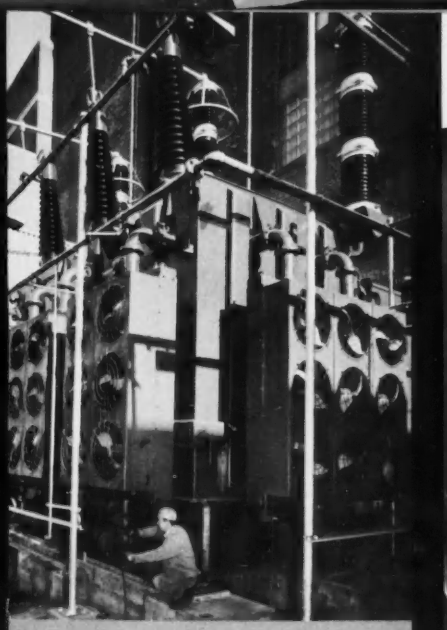
Air Conditioned Control Booth Spurs Hot Rolling Operation



J. C. HANDY, Power Sales Engineer, Baltimore Gas & Electric Co, Baltimore, Md.

Air conditioning the control booth on a hot rolling mill has paid off in better accuracy and more efficient operation at Armco Steel Corp's Baltimore works. With a 5-ton unit holding temperature at a comfortable level, the booth can be placed directly above the approach table giving the mill operator a clear view of the entire rolling process and helping eliminate production errors.

Although white-hot bars entering the mill pass within 6 or 7 ft of the operator, the air conditioned, glassed-in enclosure protects him from the intense heat. Mill noises are deadened, enabling him to work faster, more efficiently, and with greater accuracy.



Two-step reduction in power transformer insulation levels has been proved in service and recommended as sound engineering practice. Rapid advances in lightning arrester design and improved performance in recent years are largely responsible for this development. The result has been a Westinghouse transformer offering the electric utility industry major investment and operating savings.

Mr. C. W. Miller, Manager, Power Transformer Engineering, and Mr. A. M. Opsahl, Lightning Arrester Designer and Development Engineer, discuss the parallel development of improved arresters and balanced insulation of transformers.

LOWER INSULATION LEVELS

Now save utilities up to 30% on power transformer original costs alone

. . . ANOTHER EXAMPLE OF PRODUCT IMPROVEMENT

FROM PLOWBACK OF EARNINGS INTO RESEARCH

YOU CAN BE SURE...IF IT'S Westinghouse

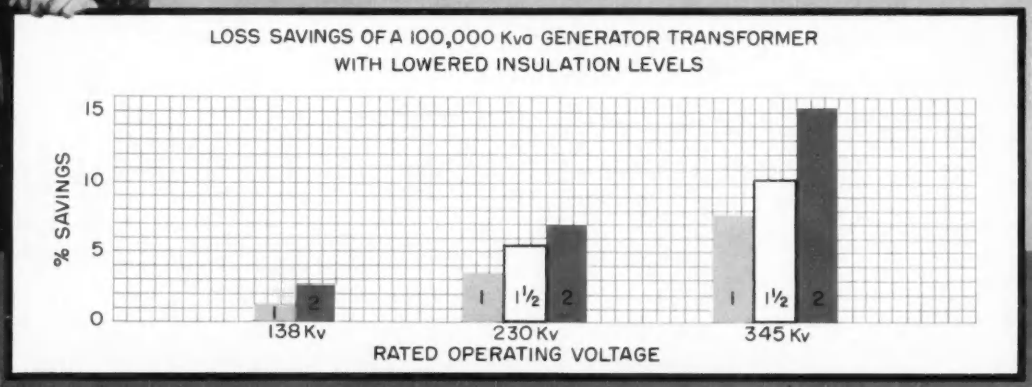
DEVELOPED THROUGH WESTINGHOUSE PLOWBACK INTO RESEARCH . . .

Lower insulation levels slash utility power transformer original investment and operating costs!

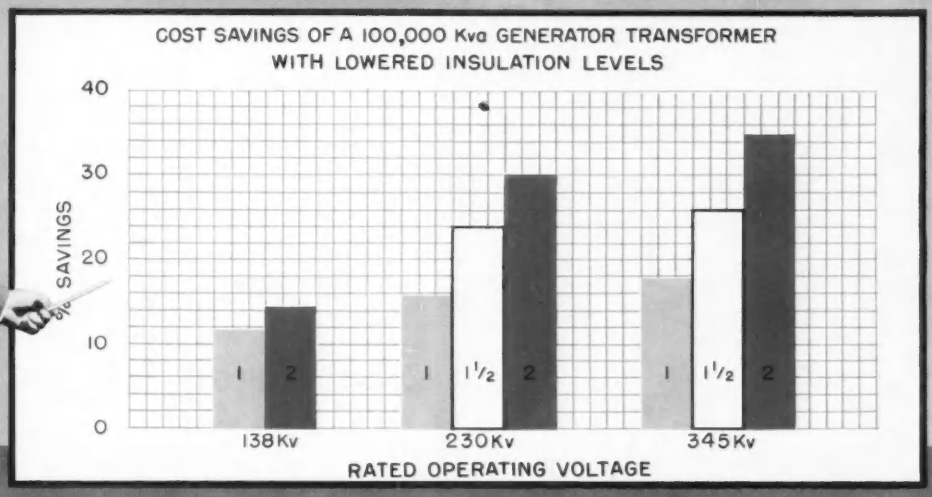
● These are the results of continuing research and development by Westinghouse since the first use of a lower-than-standard insulation level in the early 1920's. Power transformers with still lower levels of insulation now reduce utilities' cost four ways. This four-way saving with Westinghouse transformers—in lower equipment costs, reduced losses, lower impedance and reduced size and weight—has been proved for at least five years in actual service, as well as in decades of development and experimental work. This development raises considerably the practical limits of large blocks of power . . . is an outstanding example of a design with room to grow for tomorrow's growing loads.

This is another in a multitude of Westinghouse achievements made possible by plowing back profits into research and development—practical achievements that work hand-in-hand with the electric utility industry to help keep electricity America's biggest bargain.

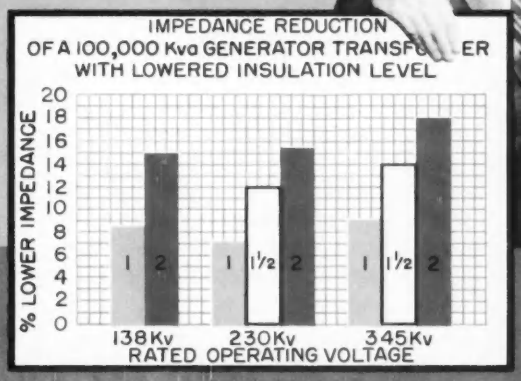
YOU CAN BE SURE...IF IT'S Westinghouse



Reduced kw Losses . . . Over 7%—A large transformer has losses of as much as 1000 kw. In this area, too, Mr. Miller points out what the savings of lower insulation level can mean. The chart shows that 2-step reduction of insulation on this transformer cuts losses 7% or 42 kw. This amounts to a saving of $10,000 to $15,000 in loss evaluation.



Lower Original Costs . . . Over 30%—Mr. Miller illustrates the considerable saving in original equipment cost when transformer insulation levels are lowered. Note that the saving effected is approximately equal to the amount of reduction of the insulation level. For example, in a 230-kv transformer, a 1-step reduction means a saving of 17% , a 1½-step reduction saves 25% and a 2-step reduction saves 30% on the cost of a transformer with full-level insulation.

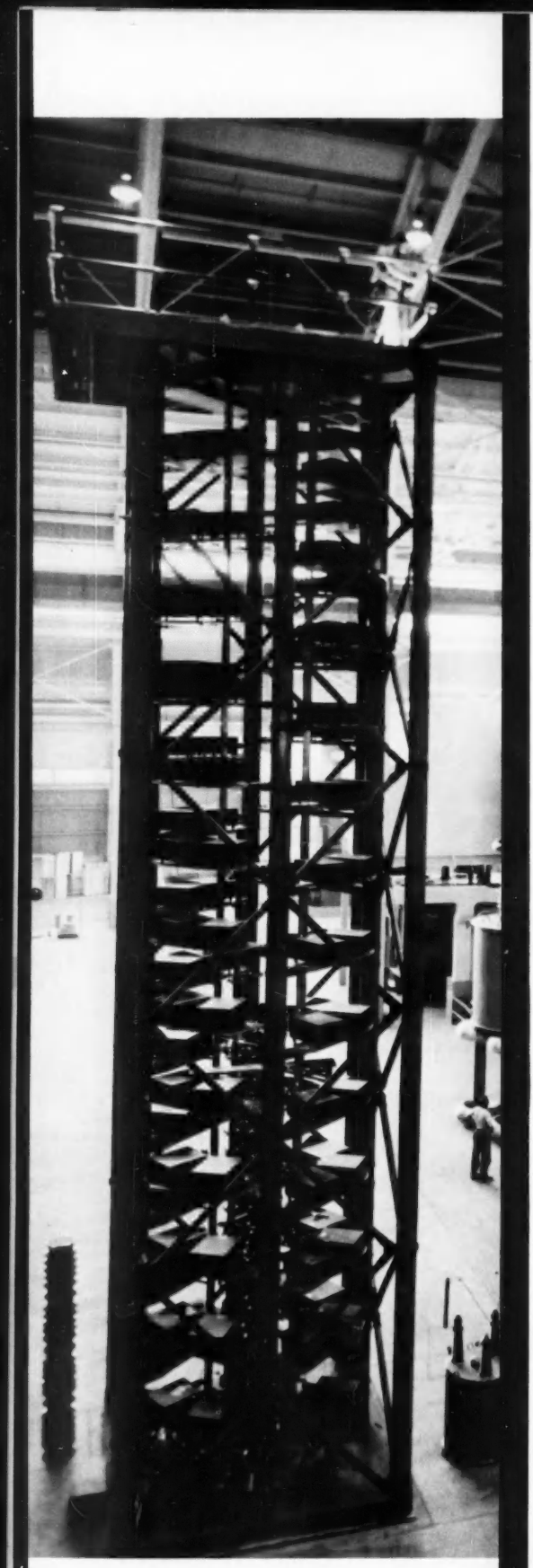


WEIGHT AND DIMENSION REDUCTION
OF A 100,000 Kva GENERATOR TRANSFORMER
WITH LOWERED INSULATION LEVELS

		FULL LEVEL	REDUCED 1 LEVEL	REDUCED 1½ LEVELS	REDUCED 2 LEVELS
138 KV	Weight	100	91.4		83.2
	Area	100	93.8		99.4
	Height	100	94.0		86.5
230 KV	Weight	100	87.5	82.8	78.1
	Area	100	93.7	86.7	81.7
	Height	100	93.2	86.5	80.5
345 KV	Weight	100	82.1	72.4	62.4
	Area	100	88.9	84.0	77.4
	Height	100	92.4	87.4	82.8

Lower Impedance . . . Over 15%—Lower insulation levels mean lower impedance, which results in further savings. A 2-step reduction in insulation level of a 230-kv transformer makes available 15% lower impedance, compared to a transformer with full level of insulation. Additional gains for utilities in the area of operating economy are realized in better system stability and voltage regulation.

Reduced Size and Weight . . . Up to 70,000 Lbs on a 100,000-kva 230-kv Transformer—The fourth major money-saving advantage of transformers with reduced insulation levels is found in their smaller sizes and weights. This means thousands of dollars saved on installation. Reduced transformer height permits reduced station structure heights; smaller size and weight permit savings in pad costs. As the demand for transformers of greater capacities grows, lower insulation levels will permit higher rated transformers to be built and shipped in one piece.



HERE IS HOW A POLICY

OF CONTINUOUS REINVESTMENT IN

WESTINGHOUSE RESEARCH

AND ENGINEERING

proves lower insulation levels practical and safe

WESTINGHOUSE TRANSFORMERS

NOW SERVING EFFICIENTLY AND SAFELY

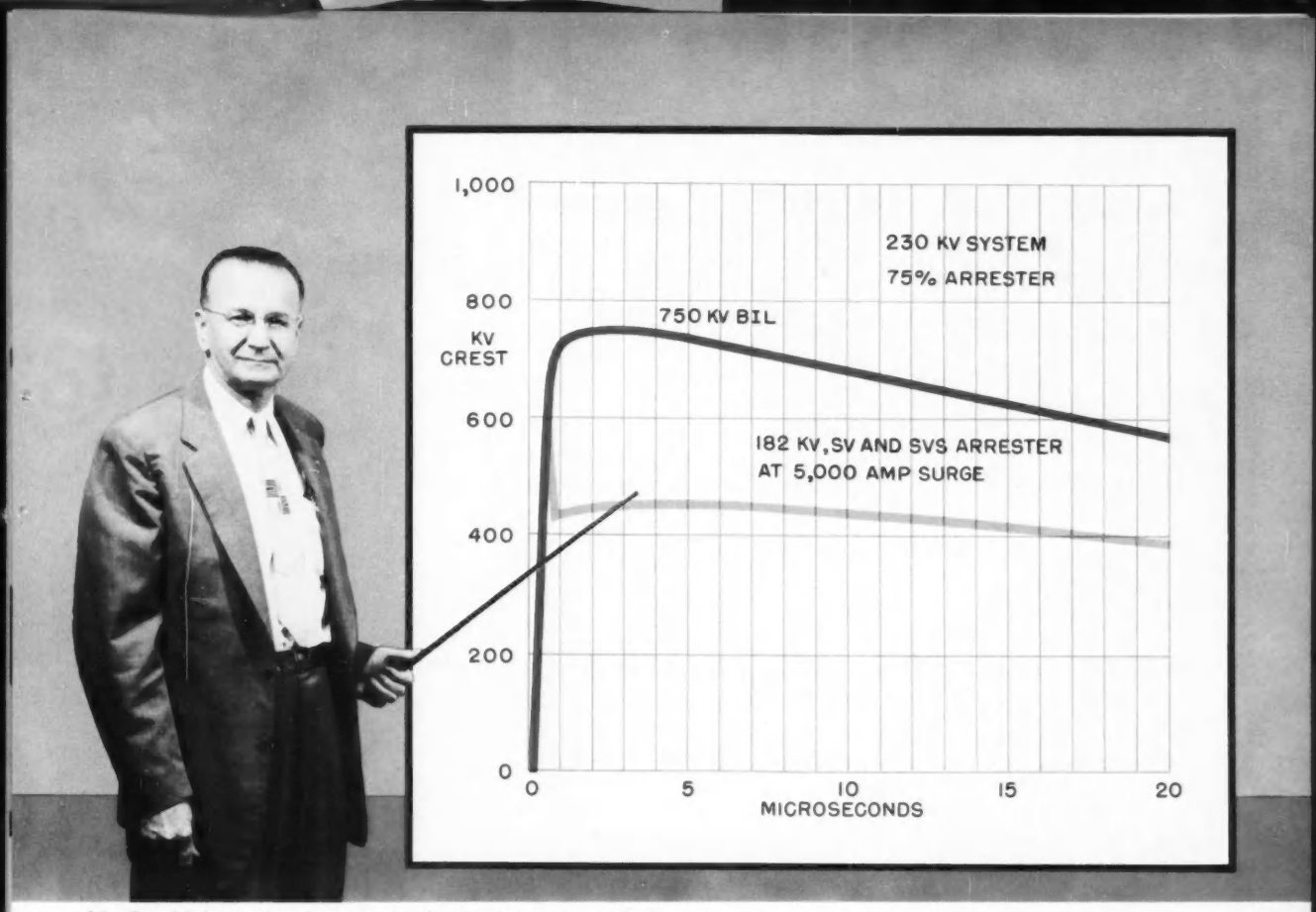
WITH BALANCED INSULATION

● Since lower insulation levels were first applied to Westinghouse Power Transformers in the early 1920's, the industry has moved steadily toward 2-step reduction. Graded insulation on transformers for grounded neutral service has been in use for many years. With the development of 345-kv systems, insulation was reduced 1½ steps; this reduction was then extended to 230-kv systems.

Westinghouse developments have contributed heavily to this trend toward lowered insulation levels. One such development was the improved SV lightning arrester, with discharge voltage reduced more than 20% over a period of years. This drop permitted protection of insulation lowered another level, without further reducing arrester ratings.

Another big stride in the development of transformers with lowered insulation levels was improved ability to withstand impulse voltages. Impulse testing of transformers, introduced by Westinghouse in the early 1930's, contributed greatly toward increased impulse strength, raising it to its present level. Impulse testing proves that transformers actually have the strength their design calls for.

5,200,000-volt surge generator at the Transformer Division new Test Center.



Mr. Opsahl shows the adequate margin of protection provided by the arrester for a 230-kv transformer with insulation reduced two steps. Similar margins of protection are assured for voltages of 138 kv through 345 kv.

Experimental work, carried out by Westinghouse in cooperation with utilities, has also contributed heavily in the trend toward 2-step reduction of insulation. Notable among these was the work at Tidd Station which resulted in 1½-step reduction in hundreds of transformers now in service throughout the country.

The results of this experimental work in the field and in Westinghouse laboratories have proved that 2-step reduction—properly designed and properly applied and protected—will give fully satisfactory service.

Impulse testing . . . your guarantee transformers have their designed strength, and more

Impulse tests on transformers are made with a 1.5 x 40 microsecond wave. The wave shape closely resembles the voltage across the arrester during discharge. Steps of test voltage establish the standard basic impulse insulation levels (B I L) which are commonly associated with circuit voltages as the full insulation level. Lowered levels of insulation have been used in higher circuit voltages where system neutral grounding permits the use of reduced rating.

YOU CAN BE SURE...IF IT'S Westinghouse

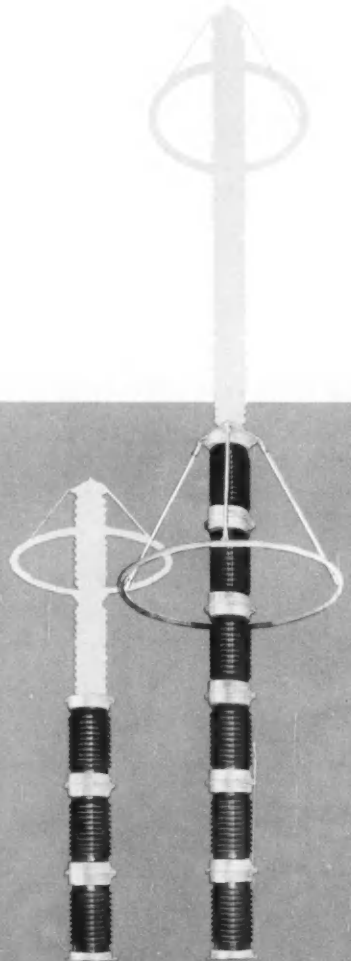
Improved lightning arresters make 2-step reduction in insulation a practical reality!

NEW LOW-IN-HEIGHT, HIGH-IN-PERFORMANCE ARRESTERS PROVIDE

GREATER PROTECTION IN LESS INSTALLED SPACE

NEW AUTOVALVE ARRESTER BLOCKS REDUCE ARRESTER DISCHARGE VOLTAGE BY 20%

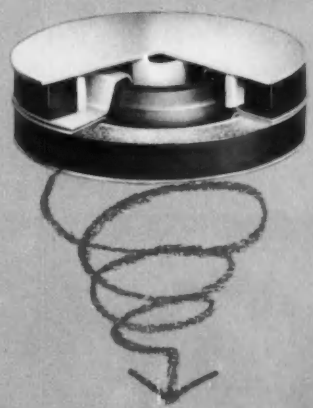
Better performance of the modern Westinghouse station arrester is due in a large degree to the improved Autovalve arrester blocks and rigid quality control to which they are subjected. Each block is surge-tested under simulated service conditions far more severe than standards require.



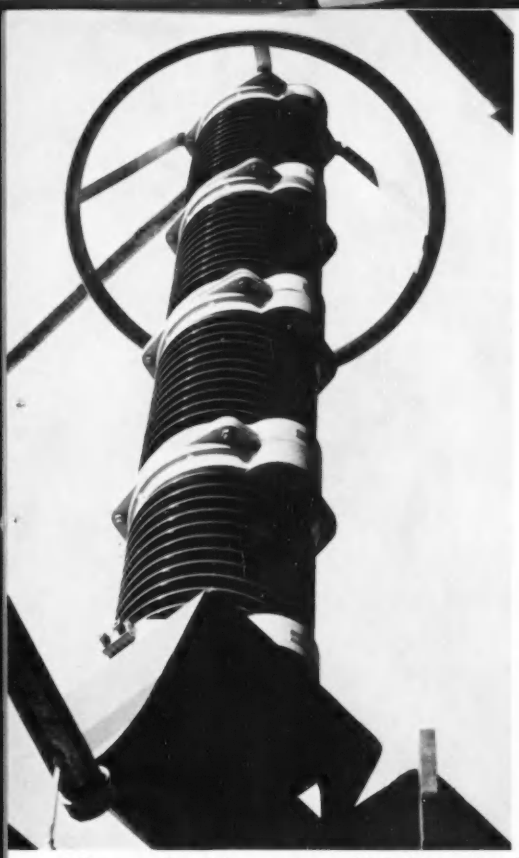
YOU CAN BE SURE...IF IT'S Westinghouse

Surge Testing of Autovalve Blocks—Tests shown here check the ability of the arrester elements to protect equipment. The surge takes place behind the screen to the right. Volt-ampere characteristics of each block are checked on the oscilloscope.

Height of Arresters Reduced 45%—Faced with the problem of increased operating requirements in less space, Westinghouse reduced lightning arrester height by almost one-half—with the same ratings. This was accomplished by physically paralleling the elements, keeping them in series electrically. These new Westinghouse SVS arresters require no supporting structure—a 20,000-pound-foot cantilever rating makes them entirely self-supporting. Installation is easier, faster, less costly . . . and the arrester now can be located closer to the transformer, physically, or directly on the transformer, providing better overall protection.



Arc Twisting Stops Arrester Electrode Pitting—New Mobilarc gaps, utilizing ceramic permanent magnets, spin the arc over the electrode, eliminating pitting and other electrode damage. Further, there is no discernible change in gap characteristics—even after as many as 1200 test operations.

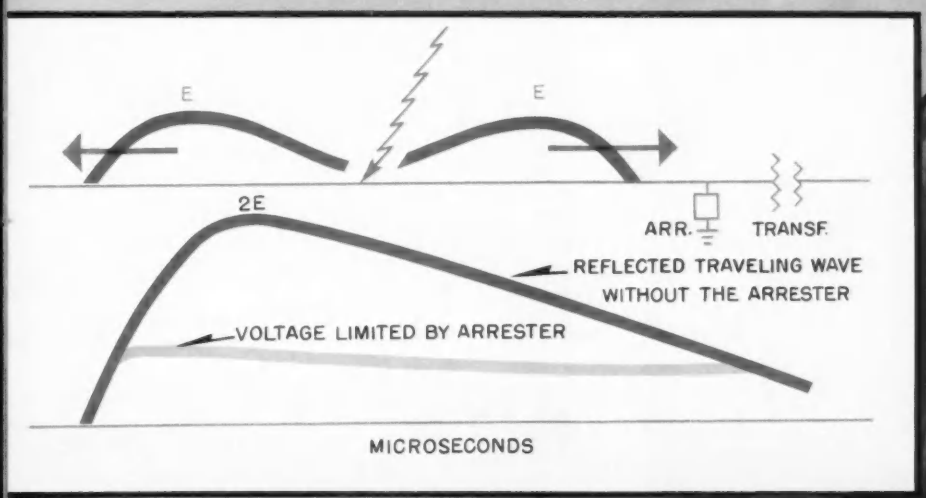


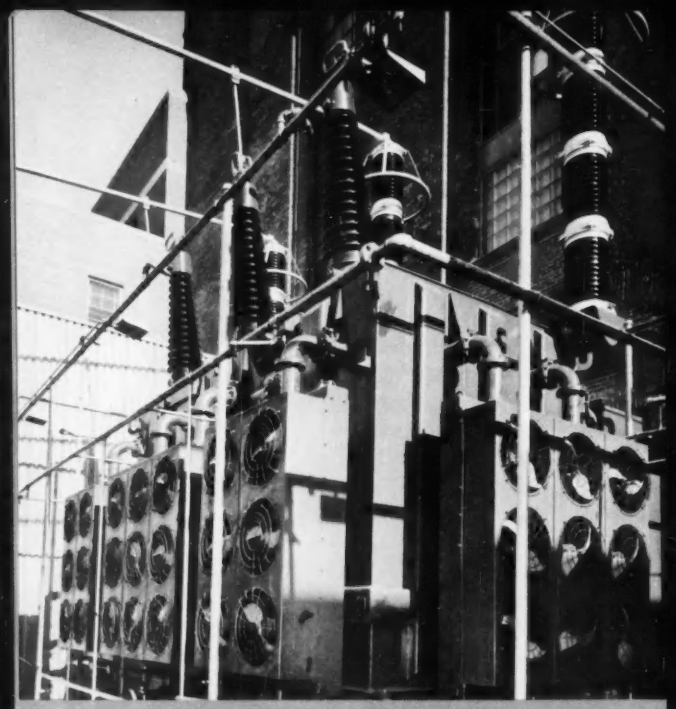
Self-supporting SVS arresters, with height reduced 45%, mount directly on power transformers rated up to 345 kv.

CONTINUING REDUCTION OF ARRESTER SURGE DISCHARGE VOLTAGES

Lightning surge voltages, above the transformer insulation level, travel along transmission lines to the transformer station. However, at the lightning arrester, this surge voltage is sharply reduced by the action of the arrester in discharging surge current from the line. Thus, the surge voltage across the arrester during surge discharge is decreased below the level of the transformer insulation, protecting the transformer from damage. Improvements in lightning arresters over the years have lowered the sparkover and discharge voltages, making possible the reduction of insulation from full level. Present arrester protection makes practical 2-step reduction where system neutral grounding permits the use of arresters rated 75% of circuit voltage.

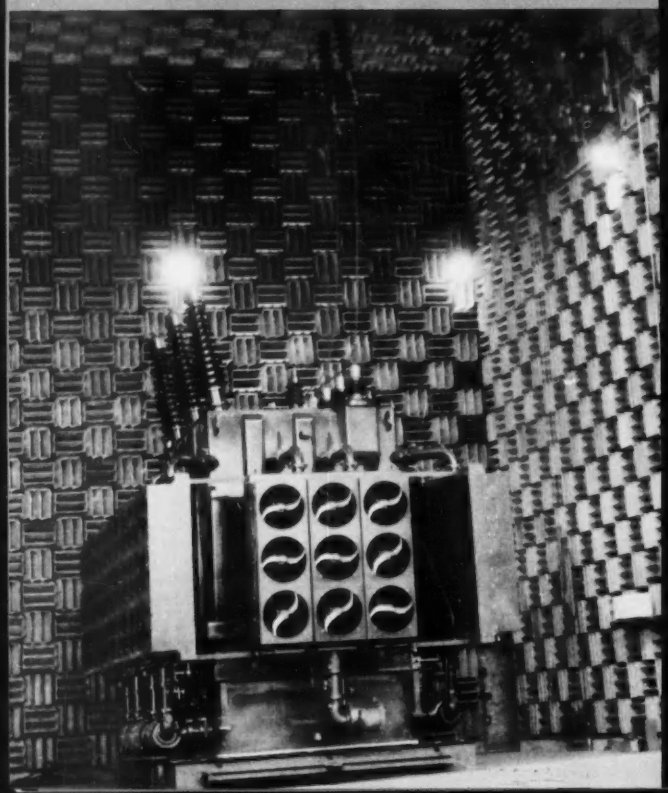
When lightning strikes, the surge voltage (E) travels the line in both directions from the struck point. At the transformer, the voltage could double to 2E. The lower wave shows the effect of the arrester on the surge voltage, limiting it to a voltage below the insulation level of the transformer.





This 240,000-kv FOA generator step-up transformer is installed at Niagara Mohawk Power Corporation's Huntley Station. Use of lower insulation levels made possible one-piece shipment of this 825-kv BIL transformer.

The Sharon Sound Laboratory is an integral part of the giant Westinghouse Test Center at the Transformer Division. It is in this test center where much of the research on lower insulation levels is conducted. Here, a half-million-pound giant is checked out before shipment.



Plowback into research and engineering at Westinghouse goes hand-in-hand with industry progress

Westinghouse has pioneered, field-tested, produced and recommended as sound engineering practice lower insulation levels, because it is in the best interests of the industry. The proof is in the savings—up to 35% in transformer cost, with additional installation and operating savings, plus a gain in operating efficiency.

Ask your Westinghouse representative to explain how the advantages of lower insulation levels can go to work for you.

CP-1043

YOU CAN BE SURE...IF IT'S Westinghouse

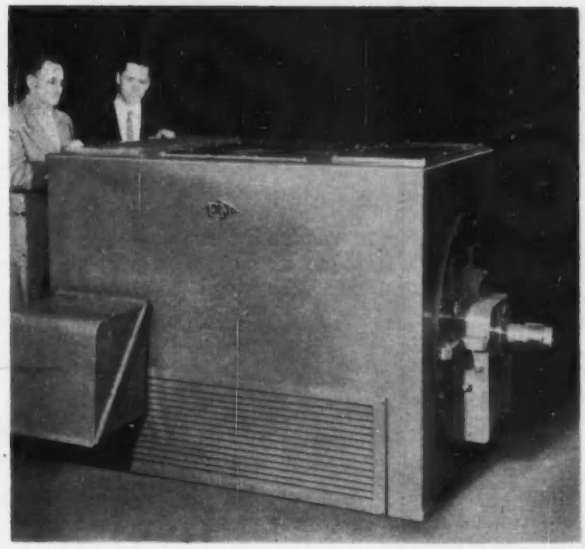
New Equipment

Post Insulator . . .

. . . can be used where 1,500-lb cantilever strength is adequate for distribution conductors. It is available with pole-top or angle brackets and has especially wide groove to accommodate all common types of distribution conductors for service up to 25 kv.

Seven-in. porcelain size weighs 7.1 lb and has 11-in. leakage distance. Nine-in. size, weighs 8.6 lb, has 15-in. leakage. Stud may be either ⅝x1.75 or ⅝x7 in.

Ohio Brass Co, Mansfield, Ohio



Ventilated BFP Motor . . .

. . . has "straight-up" ventilation to prevent warm air mixing with cool intake. Air enters at bottom, is exhausted through top without recirculation. Positive pressure air seal keeps oil out of motor. Low, box-type construction plus light covers and access plates permit easy access. Unit has low noise level, is designated Type SUV.

For rotational stability, rotor laminations are shrunk on shaft. Non-magnetic retainer anchored to steel plate locks squirrel cage in radial direction. Heavy coil lashings and rigid block spacers prevent coil ends from loosening.

Electric Machinery Mfg Co, 800 Central Ave, Minneapolis 13, Minn.

Aerial Elbow . . .

. . . has direct-acting aircraft type control cables to simplify operation and reduce maintenance. Hydraulically operated unit has fabricated rectangular arms which provide increased strength with reduced weight. For protection of workmen, upper arm and baskets are insulated. Cables are located inside arms for protection. Available in single- or twin-basket units, it will spot workmen at any level in boom range or below ground level if necessary.

J. H. Holan Corp, 4100 W. 150th St, Cleveland 15, Ohio

(More New Equipment on page 86)

I wish we had more time
and personnel to prepare
for this rate case!

Your staff is
overloaded now.
Call in the specialists and
let them carry the peak load.
HOW ABOUT PIONEER?

GIVE YOUR NON-ROUTINE
OPERATIONS TO PIONEER

Design and Consulting Engineering Services

Pioneer has specialized in designing power plants for 56 years. It designs fossil fuel, hydro and atomic plants. It forecasts load growth, selects sites, purchases and expedites equipment and supervises construction. Pioneer's other services include substation, transmission and distribution studies and design.

Services in Regulatory Matters

Pioneer offers services in all phases of Federal, State and Local regulation including rate base, depreciation analysis, cost of service studies, market analysis, certificate proceedings and rate of return.

Corporate Services

Pioneer's services in corporate matters include business and management engineering advice, financial, accounting, tax counsel, insurance, and pension planning. It maintains a complete stock transfer, ledger and dividend disbursement service.

NEW!
On your letterhead, write for 40-page booklet, "Pioneering New Horizons in Power". Describes, illustrates Pioneer's engineering services, and corporate services, from financing to operation.

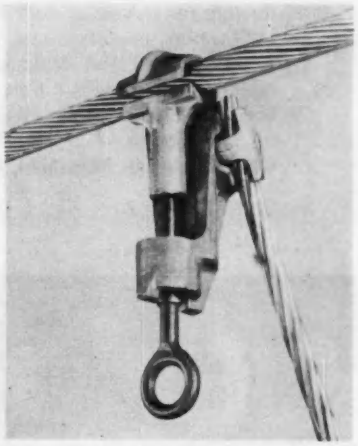
56 YEARS

Pioneer Service
& Engineering Co.

231 South La Salle Street
Chicago 4, Illinois

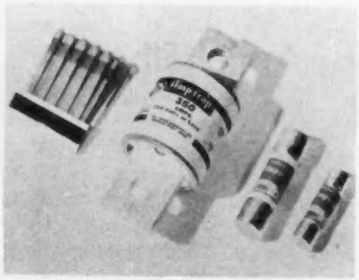
Hot Line Clamps . . .

. . . in open and enclosed thread models feature large area, high pressure main and tap contacts. Available in aluminum or plated aluminum, they have main and tap contacts on same casting for low resistance. Heavy lugs and full size eye facilitate use with hot line tools.



HLP enclosed thread line has vanadium steel spring to compensate for cold flow, relaxation, temperature change, and heavy fault currents. This line consists of 3 clamps which accommodate all cables between No. 6 and 636 Mcm ACSR. Open thread line, HL, includes five clamps that take cables between No. 8 and 1,431 Mcm ACSR.

Anderson Electric Corp, Birmingham 1, Ala.



Current-Limiter . . .

. . . can be used with short circuit currents up to 100,000 amp symmetrical, and becomes current-limiting at about four times normal rat-

(*More New Equipment page* 88)

GUY-GRIP dead-ends...

the modern twist in guying

The picture comparison makes GUY-GRIP dead-end benefits obvious:

1. THE ASSEMBLY LOOKS BETTER...
slim, modern GUY-GRIP dead-ends, free from bolts, give your guying jobs a finished, craftsmanlike appearance.

2. YOU SAVE *HOURS* OF COSTLY TIME...
takes only a minute to install a GUY-GRIP dead-end — about the same time spent in securing one nut and bolt.

3. YOU ELIMINATE ALL TOOLS...
wrenches, pliers, and other tools are completely unnecessary in applying GUY-GRIP dead-ends. The operation is done entirely by hand.

4. ASSURES POSITIVE GRIP...
under all field conditions, whether the guy is relaxed or under tension. Once the legs of the GUY-GRIP dead-end are entirely applied to the strand, you *know* the assembly is complete and permanent.

5. RESISTS STRAINS AND WEATHER...
GUY-GRIP dead-ends can take an unbelievable beating. Tension, impact, temperature extremes . . . whatever force is exerted against GUY-GRIP dead-ends, they withstand the most extreme conditions, never relinquishing a single ounce of their gripping power.

These are only a few of the many reasons why you might want to try the modern twist in guying. Write for more information: Preformed Line Products Company, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland.

PLP 10 YEARS OF Power Line Progress

You can look up to

Preformed

Made in accordance with or for use under U. S. Patent No. 2,761,273; other patents issued and pending.

BERMICO® electrical conduit used in new Boston parkway system

because..."it combines maximum protection with minimum cost," says S. Rotondi & Sons, Inc.,

General Contractors
Stoneham, Mass.

BERMICO ELECTRICAL CONDUIT

Power lines for Metropolitan District Commission lighting are encased in Bermico Conduit.

The installation, shown above, is along Route 28, Medford, Massachusetts, and is part of the new metropolitan parkway system around greater Boston.

Bermico Conduit is made from cellulose fibre impregnated with pitch, and is engineered to the most exacting standards. It is alkali-resistant, acid-resistant, light, strong, uniform, and is installed quickly and easily. Bermico Conduit is specified by public utilities and by consulting engineers from coast to coast. For speedier cable installation specify Bermico Conduit. Immediate shipment of all sizes and fittings guaranteed.

Distributed by **WESTINGHOUSE** Electric Supply Company

Offices in principal cities

BROWN COMPANY

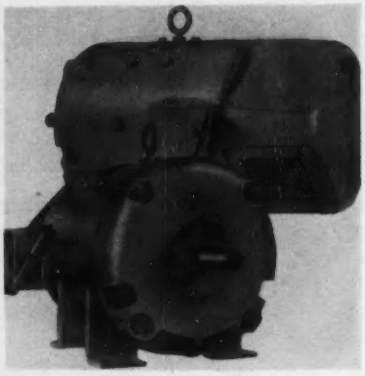
BERLIN, N. H.

General Sales Office: 150 Causeway Street, Boston 14, Mass.

Current Limiter *(continued)*

ing. Available in wide variety of capacities and sizes for 65-130 or 250-v circuits in rectifier and power applications, it can be used to protect small silicon or germanium diodes, oscillograph circuits, and very delicate instrumentation.

Current limiter will carry one to 10,000 amp normal current continuously. Depending on rating, the Amp-Trap Form 101 protects against overload but blows instantly on short circuit before damage can be done. High protective rating is obtained by massive copper blocks and "silver-sand" construction.
Chase-Shawmut Co, Merrimac St, Newburyport, Mass.



D-C Motors . . .

. . . in frame sizes from 180 through 586 are interchangeable, rating for rating, with corresponding a-c induction motors. Line ranges from ½ to 200 hp, ¾ to 200 kw. Equipped with full Class B insulation, they operate at a continuous 60-deg F rise. A corresponding line of d-c generators is also available. DC Bulletin No. SB-182 has data. **Marathon Electric Mfg Corp, Wausau, Wis.**

Two-Ton Chain Hoist . . .

. . . can be used for sagging long conductor spans, pulling up slack guy wires, and other heavy duty work. Weighing only 24 lb, it has aluminum housing and handle, with

(*More New Equipment on page* 91)

the growth of a giant...

. . . Enjay Butyl rubber, a man-made giant molecule. Invented in 1937, first produced in 1943, Butyl went immediately to war, replacing natural rubber for the manufacture of inner tubes.

Since the war, Butyl has been applied to many other exciting uses. Its wide variety of outstanding physical, chemical and dielectric properties give it a versatility unmatched by any other rubber, natural or synthetic. Today Butyl makes possible better quality automotive, electrical, industrial and domestic products.

For a closer acquaintance with this remarkable young giant, contact the Enjay Company. A complete brochure is yours for the asking.

ENJAY BUTYL

Pioneer in Petrochemicals

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ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.

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A MAJOR ACHIEVEMENT IN POWER

the new C-D 100

Another C-D first!

CORNELL-DUBILIER announces the first individual capacitor unit rated to deliver a full 100 Kvar. It is available in standard voltage ratings of 4800, 6640, 7200, 7620 and 7960 volts.

Because it reduces by one-half the number of (50 Kvar) capacitors required for substation racks and pole-mounted banks, these 100 Kvar units occupy less space and cut installation and maintenance costs.

All of the advanced features exclusive with C-D power-factor capacitors – including the lowest volts per mil (333 v.) and power losses considerably below the NEMA limit of 3⅓ watts per Kvar are incorporated. Every unit is factory-energized for hours at full-rated voltage as a final quality check.

Insure low-maintenance service from your next power-factor installation, by talking it over first with a C-D engineer. Just write to Cornell-Dubilier Electric Corporation, South Plainfield, N. J. Dept. D-38.

CORNELL-DUBILIER CAPACITORS

CORNELL-

FACTOR CORRECTION...

The power factor
capacitors that
give you better than
99.6% trouble free
DUBILIER service!

Chain Hoist *(continued)*

hardened steel shaft. Simple controls can be operated without removing heavy work gloves. Unit is proof-tested to 6,000 lb.

Hoist "free wheels" at the flip of a lever. Lever locks automatically when the hoist pulls a strain. Unit has 5.5-ft lift plus half- and full-link take-up. Ratchet-type handle can be operated from either side of housing. Hook swivels freely to allow for unwinding action of rope or wire under tension. Either regular or safety hook may be obtained.
A. B. Chance Co, Centralia, Mo.

Load Control . . .

. . . designed for 3-phase induction motors responds to changes in input power. Designated the MEK-2134, it has high sensitivity even when load is only 30% or less of rated load. It can be used for loss of prime on pumps, determining when a machine process has started, and for certain fan and blowers.
Machinery Electrification Inc, 56 Hudson St, Northboro, Mass.

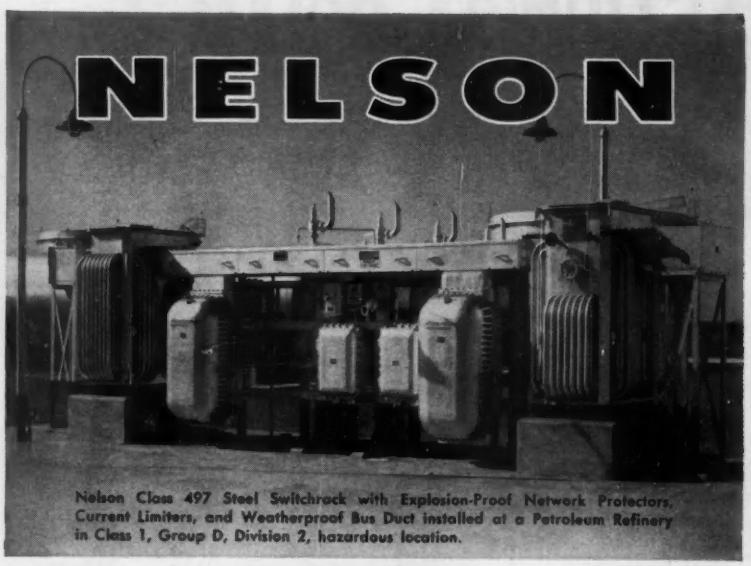
Breaker Enclosures . . .

. . . in general purpose and raintight designs are available for molded case breakers rated 15 to 800 amp. Ratings through 10 amp include insulated groundable neutrals; for units of 225 amp and up, neutral may be ordered separately.

General purpose NEMA Type 1 enclosures may be obtained in flush or surface mountings with either external handle-operating or handle-through cover operation.
General Electric Co, Plainville, Conn.

Lighting Transformers . . .

. . . in 1, 2, and 3-kw ratings are redesigned with end bells instead of complete enclosure. With core exposed to air, these type CB transformers have improved heat rise characteristics and overload protection. Endbells have self-contained wiring compartment.
Marcus Transformer Co, Inc, Rahway, N. J.



Nelson Class 497 Steel Switchrack with Explosion-Proof Network Protectors, Current Limiters, and Weatherproof Bus Duct installed at a Petroleum Refinery in Class 1, Group D, Division 2, hazardous location.

THE ***dependable name for electrical control equipment in the petroleum industry.***

When control equipment is specified for Class 1, Group D, hazardous locations investigate NELSON . . . first. Be guided by 20 years of engineering and manufacturing experience that assures you of getting the highest quality, easiest installed electrical equipment.

For safe, dependable products, and personalized service, call your NELSON representative.

Among the explosion-proof products designed for Class 1, Group D, hazardous locations manufactured by NELSON are:

- CIRCUIT BREAKERS
- PANELBOARDS
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- PIPE LINE SAMPLERS
- SWITCHRACKS
- MOTOR STARTERS
- CONTROL and TRANSFER SWITCHES
- JUNCTION BOXES
- HIGH-VOLTAGE MOTOR STARTERS

a major source of electrical control equipment for industry

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

NEW LITERATURE

• **GE PUBLICATIONS:** The following bulletins have been published by General Electric Co, Schenectady 5, N. Y., unless noted.

Supervisory Control, 16 pages of descriptive information on supervisory control equipment for industrial and utility applications. GEA-6603

Distribution Panelboard, a heavy-duty fusible power board with rigidly-mounted quick-make, quick-break switch units is the subject of this 4-p bulletin. GE, Plainville, Conn. GEC-1382A

Fluorescent Lighting gives advantages and features for streets, underpasses, shopping centers, parking lots, service areas, etc. (4 pp). GEA-6441A

Static Speed Control (4 pp) discusses static speed control for paper machines, stressing high accuracy, low drift and high speed of response. GEA-6275A

Electric Brake Application (8 pp) provides technical data on the application of ac and dc brakes. Discusses application performance, operation and characteristics of solenoid-operated, Thrustor-operated and magnet-operated brakes. GET-2770

Individual Motor Control (8 pp) discusses coordinated starters for low-voltage motors, controls for squirrel-cage, wound rotors and synchronous, various types of starters, and contractors, over-loading relays and accessories and modifications for individual motor controls. GEA-6584

Liquid Rheostats: Two bulletins (8 pp. ea.). One discusses applications of liquid rheostats to provide stepless secondary control of high hp wound rotor motors; the other describes operating characteristics of liquid rheostats in various applications. GEA-6664, GET-2740

• **ELECTRICAL TAPES AND EPOXY RESINS:** Application information and specifications for pressure sensitive electrical tapes and epoxy resins for electrical insulations are listed in 32-p catalog, E-PCLC (1271.5) TL. Minnesota Mining and Manufacturing Co, 900 Bush Ave, St. Paul 6, Minn.

• **SILICONES:** 11-p report outlines the properties of silicones as dielectric materials, and discusses the use of silicone rubbers, fluids, resins, and compounds in various applications. No. 10-105. Dow Corning Corp, Midland, Michigan.

• **CAPACITOR RACK ASSEMBLIES:** Bulletin PC 4, 16 pp, describes features, ratings, and dimensions of single-row, three-row and cluster type capacitor rack assemblies. Line Material Industries, Milwaukee 1, Wisc.

• **ATOMIC POWER:** 30-p booklet tells about electric power from the atom and what it will mean to U. S. citizens. Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y.

Do you worry about power distribution costs WHILE YOU'RE AT LUNCH?

If you're figuring costs of that new power distribution system — either in an old building or that new one you're planning — here's one way to help you keep costs down and assure you of dependable service — specify and use Rockbestos A.V.C. (Asbestos, Varnished Cambric insulated) Interlocked Armored Cable.* Here's how:

- You save important dollars by eliminating the need for costly conduit or ducts.
- It cuts installation time and permits quick, easy repairs.
- Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable.
- It's easily installed on racks or hangers beneath the ceiling or next to walls.
- It can be installed up, down or around walls, beams or posts.

Get all the details on Rockbestos A.V.C. Interlocked Armored Cable. Write now for catalog which gives complete specifications and application data.

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NEW HAVEN 4, CONNECTICUT | NEW YORK, CLEVELAND, DETROIT, CHICAGO, PITTSBURGH, ST. LOUIS, LOS ANGELES, NEW ORLEANS, OAKLAND, SEATTLE

*Single conductors are standard N.E.C. Type AVA power cables.

ROCKBESTOS

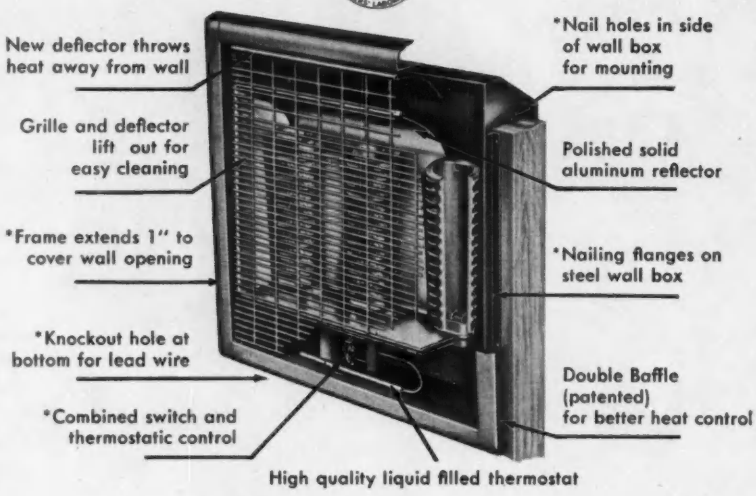
A. V. C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits

1st in QUALITY...

FIRST IN FEATURES!

U. L. APPROVED


New deflector throws heat away from wall
Grille and deflector lift out for easy cleaning
*Frame extends 1" to cover wall opening
*Knockout hole at bottom for lead wire
*Combined switch and thermostatic control
*Nail holes in side of wall box for mounting
Polished solid aluminum reflector
*Nailing flanges on steel wall box
Double Baffle (patented) for better heat control
High quality liquid filled thermostat

*Saves time on installation.

Special surface mounting kits available.

Cavalier

AUTOMATIC ELECTRIC WALL INSERT HEATERS

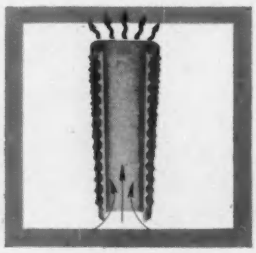
Smart styling plus extra features make Cavaliers easy to sell. The modern, forward-thrust Wall Insert shown is typical of the line. Easily installed, too. You profit from satisfied customers, fewer call-backs. Finest quality throughout. 10 Year Guarantee on heating elements. Complete selection of styles and sizes to give you the inside track on any job.

SELL WITH CONFIDENCE . . . SELL CAVALIER!

Write for catalog and prices on complete line.

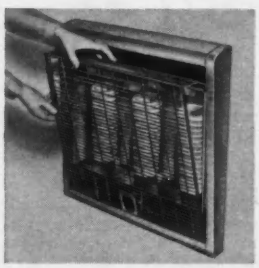
Cavalier Corporation
Electric Heating Division
Chattanooga 2, Tenn.

Quality for over 90 Years



EXCLUSIVE

Patented tapered cone construction produces 1/3 more heated air up through element.



EXCLUSIVE

Easy cleaning in 3 minutes or less. No screws or bolts to remove. Grille lifts out, hinged reflector tilts forward.

Protects Transformers

(*Continued from page* 51)

crowave transfer trip in service soon on four additional lines, two between stations G and E and two between stations H and E. These two links utilize microwave equipment operating in the 1,900-Mc band. The tone equipment operates in the 4-kc frequency range, tones being placed 400 cycles apart. It modulates the microwave transmitter directly without use of a subcarrier.

Except for the differences in frequencies, the tone equipment is identical with the 960-Mc equipment and is applied to the circuits in the same manner. These transfer-trip circuits will provide high-speed protection to transformers at stations G and H.

Since placed in service, transfer tripping has been constantly available on the Baltimore G&E system. Weather conditions have varied from very hot to very cold, and from clear and mild to heavy rainfall. There have been severe electrical storms, snow storms, and even a hurricane with winds recorded at 75 mph. Transfer tripping was required to operate on several occasions, and each time it did so correctly. Of two false operations, one was caused by a shorted tube element in the modulator circuit of the microwave transmitter and the other by a defective tube in the tone receiver. Steps to prevent their recurrance include increasing the sensitivity of the squelch circuit and more frequent checks on the electron tubes involved.

Equipment Ordered

The company has on order some frequency - shift, transfer - tripping equipment for use on the microwave channels. It will require a channel band width of approximately 800 cycles, and the frequency shift, from "guard" to "trip" frequency, will be about 300 cycles. Completely transistorized, it will operate from the station control battery. Reception of the guard tone will provide continuous monitoring, and the loss of either the complete channel or the guard tone will not cause tripping.

Thus, it is hoped that the objective of continuous monitoring and fail-safe operation will be realized.

Sangamo J2 Meters

CLASS 100 AND CLASS 200

Give you all the revenue you've got coming

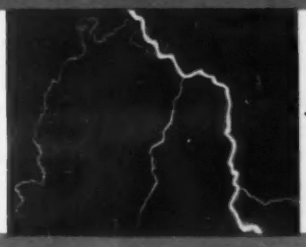
Sangamo watthour meters start on a 9 watt load and measure accurately to full 100 or 200 amperes. Will fully record the lightest loads of today and the heaviest loads of the future.

Give you all-weather accuracy

Corrosion-resistant finishes and materials are used throughout J2 Meters. You get optimum performance in humid, salt-laden or corrosive industrial atmospheres.

Give you protection against surge voltages

The extremely high insulation level of J2 Meters withstands high-voltage surges without damage. Highly surge-resistant Alnico damping magnets resist the de-magnetizing effects of lightning.



Give you sustained accuracy at all loads

Sangamo J2 Meters have the highest starting torque in the industry. Their accuracy is not affected by friction caused by foreign matter—even down to the lightest loads.

Give you slowest disk speed

Only 10 revolutions per minute at full nameplate rating means longer meter life—and pleases meter-watching customers, too!

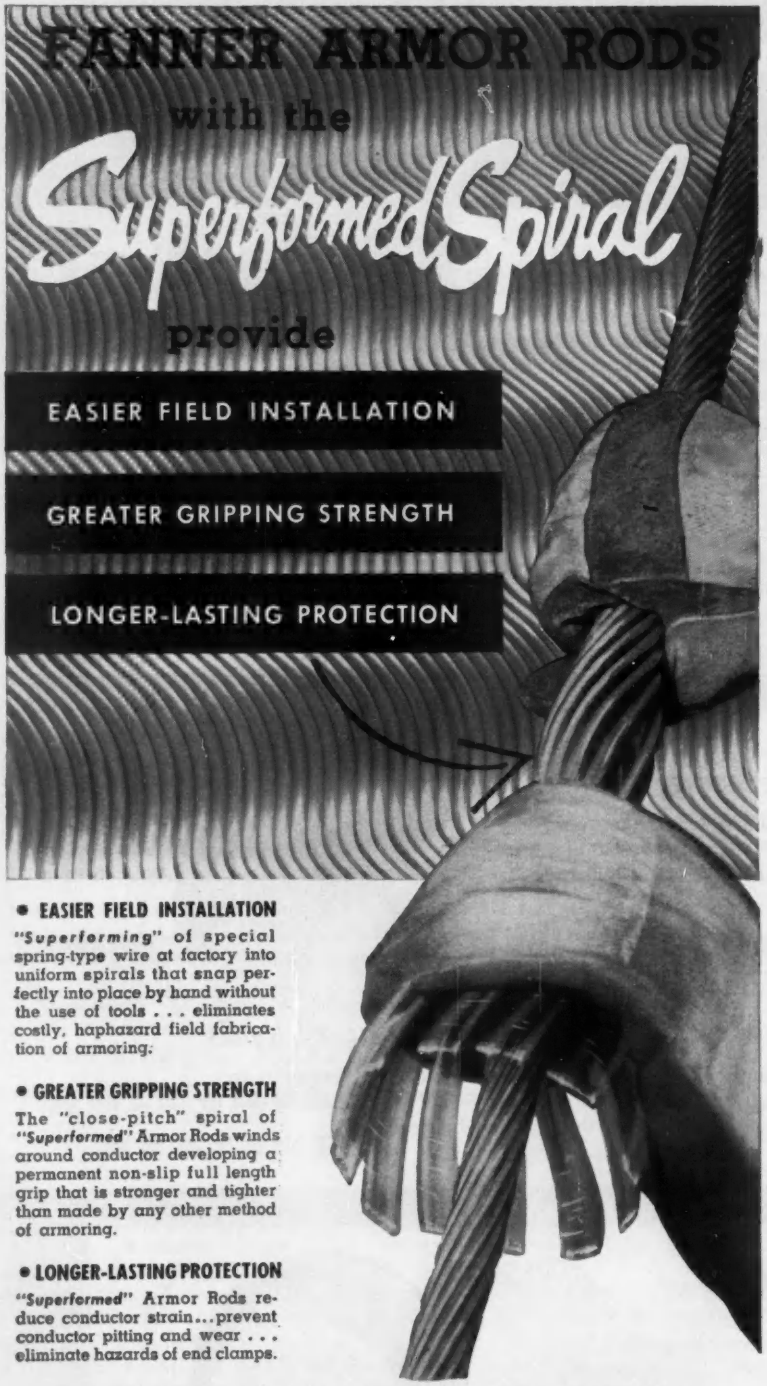
...AND ARE GUARANTEED FOR LIFE!

Now, an unprecedented lifetime guarantee—covering materials, workmanship and *bearing systems*—is offered on all Sangamo J2 Meters.

JM58-1

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS



• **EASIER FIELD INSTALLATION**

"*Superforming*" of special spring-type wire at factory into uniform spirals that snap perfectly into place by hand without the use of tools . . . eliminates costly, haphazard field fabrication of armoring.

• **GREATER GRIPPING STRENGTH**

The "close-pitch" spiral of "*Superformed*" Armor Rods winds around conductor developing a permanent non-slip full length grip that is stronger and tighter than made by any other method of armoring.

• **LONGER-LASTING PROTECTION**

"*Superformed*" Armor Rods reduce conductor strain...prevent conductor pitting and wear . . . eliminate hazards of end clamps.

To get the best — specify Fanner "*Superformed*" Armor Rods. Get acquainted with the important savings they offer by writing for descriptive literature today.

CENTER-MARKED, COLOR CODED AND PACKED IN CONVENIENT CARTONS

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PLASTIC FANNGUARDS · PLASTIC INSULATING TUBINGS AND MOLDINGS

Pressurized Water Reactor

(*Continued from page 58*)

power. The other is a 350-kw diesel-driven, motor-generator set.

Great flexibility is provided with this system and only the most severe fault conditions will shut down the reactor completely. Should a fault occur on the 138-kv bus, power to the electrical auxiliary system from both the main generator and the system network will be lost. But the direct line through the 23-kv standby transformer can be manually closed in on the auxiliary system.

A fault on the generator main leads will trip the generator field and main transformer breakers. Such a fault will also open the breakers feeding the two 2,400-v buses from the generator main leads. Under these circumstances the tie breakers on the de-energized 2,400-v buses will close and supply potential from the buses fed from the system.

Because the load of the generator will be lost, the turbine and reactor control circuits will function as previously described. But the ability to keep all four auxiliary buses energized will assist in an orderly shutdown and a swift return to operation should this be possible.

A fault on any one of the four auxiliary buses will result in its isolation from the rest of the auxiliary system. The main feeder breaker to the bus or the tie breaker, whichever is closed, will open. Load on the reactor will be reduced in accordance with the number and importance of the auxiliaries lost because of the bus failure.

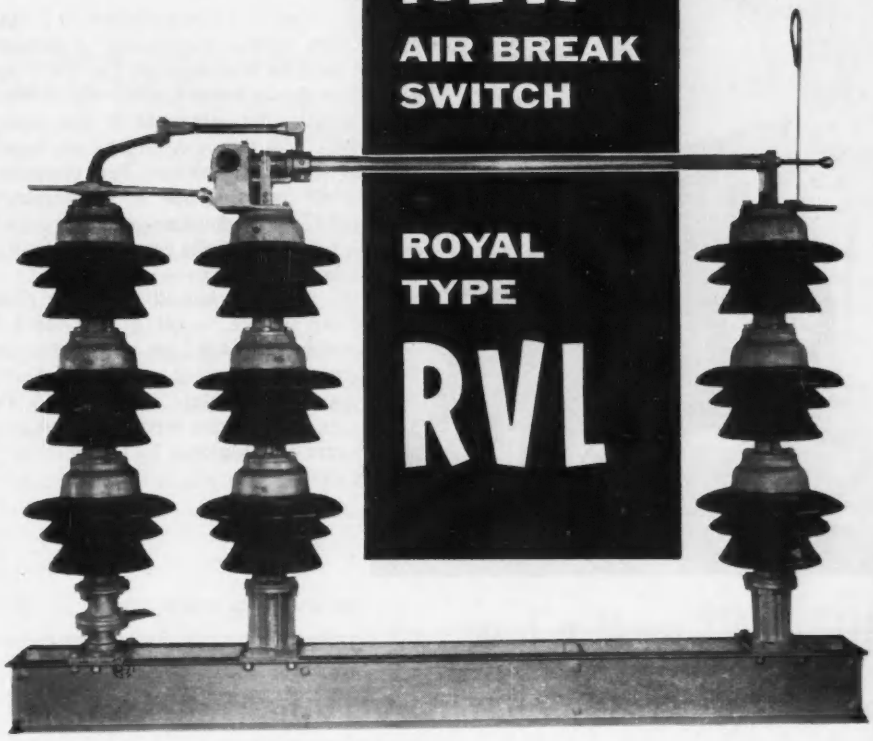
If the main generator, 138-kv system feed, and 23-kv transformer feed are lost, all power to the station is lost. The diesel generator unit must then be started and a limited amount of power may be supplied to carry out a reactor and turbine plant cool down.

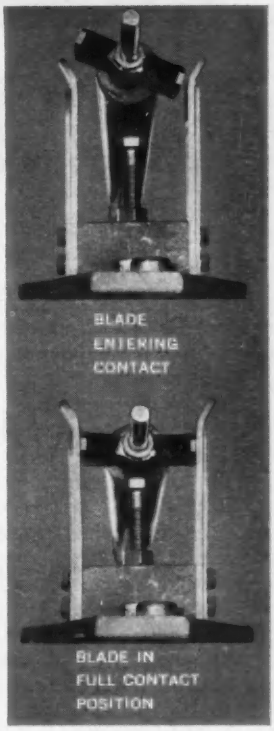
Shippingport's Vital Statistics

Type of reactor . . pressurized water
Reactor thermal power . . . . 236 Mw
Electrical output . . . 60 Mw (initial)
100 Mw (ultimate)
Moderator . . . . . light water
Coolant . . . . . light water
Coolant temperature. 525F (average)
Coolant pressure . . . . . 2,000 psi
Steam temperature 480F
Steam pressure . . . . . 585 psi
Number of coolant loops . . . . . four

an
ENTIRELY
NEW
AIR BREAK SWITCH

ROYAL TYPE
RVL





Silver Elkonite contact inlays... fully insulated bearings

Acting on suggestions and recommendations from the electric power industry, Royal has devoted 3 years of exhaustive research and development to this *better* and *more economical* switch.

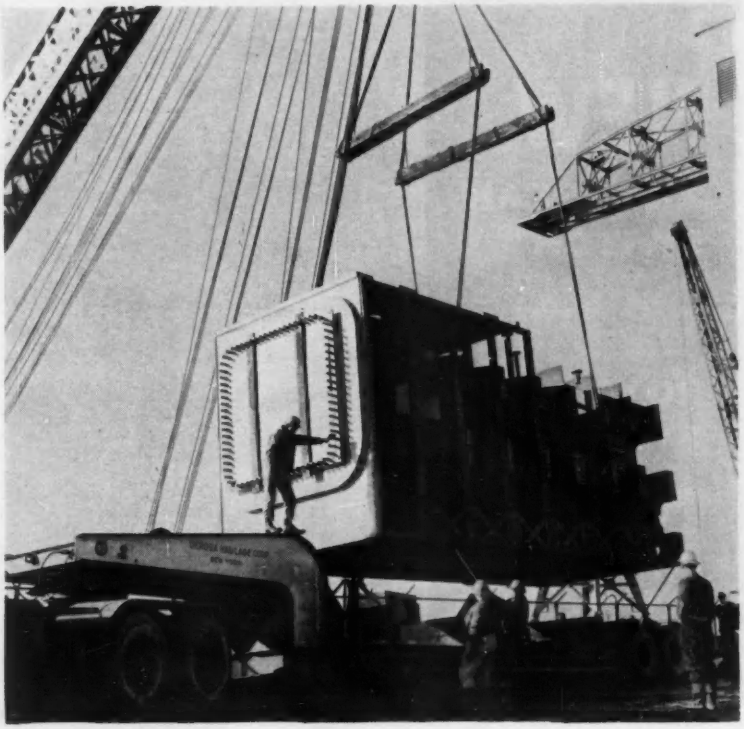
Its unique design—free from complicated mechanisms—is completely illustrated and described in a new Royal bulletin now ready for release. Included are all engineering specifications and operating data, detailed photographs and drawings, and catalog and ordering information.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN 20-A

Royal

ELECTRIC MANUFACTURING CO., INC.

1122 E. 87th Street **Chicago 19, Illinois**



Condenser to Carry 137.5 Mw T-G Unit

One of 13 components of a 500-ton turbine-supporting condenser, built by Westinghouse Electric Corp, is shown being loaded onto a truck trailer for shipment to the Jersey Central Power & Light Co's Sayerville, N. J., station. This condenser will be used for a Westinghouse 137.5 Mw turbine-generator which will increase the capacity of the station to 375 Mw.

The unit has 80,000-sq ft cooling surface, is 60 ft long, 24.5 ft wide and 14 ft high. It supports the turbine-generator as a unit and with its superstructure weighs 1,365,000 lb. The turbine support is 80 ft long and an additional 11 ft high.

GE Reports on I-60 Meters, "Quiet" Dry-Type Transformers

The I-60 Class 200 meter has been certified for accuracy and performance, and dry-type transformers have sound levels of 45 decibels or below. These are significant developments announced by General Electric Co.

Meters: The extended range I-60 watthour meter now has enough test data compiled to permit certification of accuracy and performance. Meter Department manager Donald E. Craig announced that average accuracy (Bar X) of the I-60 is within 0.1 of the reference kilowatt-hour and the standard deviation is less than 0.15% at full load and less than 0.2% at light load.

The certification of the I-60 Class 200 meter, as well as the I-50 family of Class 100 meters, was made possible by exacting quality control procedures, according to Craig. Meter Department personnel carefully reviewed extensive test data compiled over a six-month period.

Transformers: "Quiet" dry-type transformers rated through 50 kva single-phase and 150 kva three-phase have sound levels of 45 decibels or below.

In making noise analyses, transformers to be tested are sealed in a sound analysis room which has an ambient noise level of less than 10 decibels, believed to be the lowest of any of its type. It is a free field (anechoic) chamber exceeding NEMA specifications (EW, Dec. 2, 1957, p. 94).

The sound level of a transformer is the arithmetic average of five measurements according to GE engineers.

Four measurements of the sound level are taken. One is taken opposite each major sound-producing surface with the transformer operating at rated voltage and frequency. Four measurements are taken at intervals of approximately 90 deg around the transformers. One measurement is taken above the transformer on the vertical axis.

A-C Contracts to Build 111,500-Hp Hydro Turbine

Allis-Chalmers Manufacturing Co has been awarded a contract for a 111,500-hp, 210 ft head, 138.5-rpm Francis runner type hydraulic turbine by the Alabama Power Co. It is for installation in the proposed Lewis Smith Dam hydro plant at the power company's Warrior River project.

The turbine, scheduled for shipment in 1960, is for an expected operating range of from 197 to 245 ft. Water will be supplied through a

steel and concrete lined tunnel about 740 ft long and 25 ft ID. The inlet to the turbine plate steel scroll case will be approximately 18 ft in diam.

The plant will be interconnected with Alabama Power Co's transmission system and will supply peaking and regulating service to it.

Meramec Station to Have Second F-W Unit

Foster Wheeler Corp, New York, has obtained a contract for a single furnace steam generator to be installed in the Meramec Station of Union Electric Co, St. Louis, Mo. It will have a steam capacity of 2,310,000 lb per hr at 2,200 psi, 1010/1010F, and will be used with a 300-Mw turbine.

This steam generator will be the second such unit ordered for the utility's station, and will be completed in 1961. Fuel will be coal which will be pulverized in three ball mills at the rate of 267,000 lb of coal an hour.

U. S. Aluminum Production

Primary aluminum production in the United States for January was 139,909 tons, according to The Aluminum Association, New York. This amount was a decrease from January, 1957, when production was 147,030 tons. Production for December, 1957 was 140,033 tons and the total for the year 1957 was 1,647,710 tons.

Aluminum Assoc. Elects

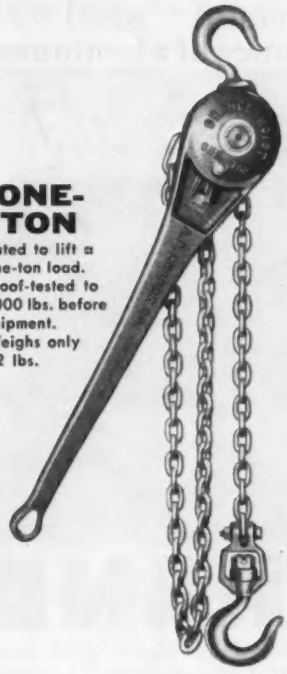
The Aluminum Association, New York, has elected the following officers: President: S. D. Den Uyl, president, Bohn Aluminum & Brass Corp, Detroit; Chairman of Board of Directors, Everett G. Fahlman, president, The Permold Co, Medina, Ohio; and Vice Presidents: Frederick A. Merliss, United Smelting & Aluminum Co, Inc, New Haven, Conn.; Russel B. Caples, president, Anaconda Aluminum Co, New York; Frank R. Nichols, president, Nichols Wire & Aluminum Co, Davenport, Iowa.

(*More M&M page* 100)

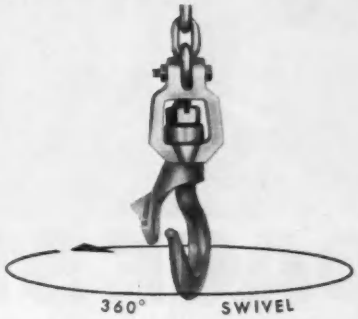
NOW...the "Lineman's Hoist"

with an important NEW feature

This popular lightweight, fast-operating hoist now has a 360° SWIVEL hook with a thrust bearing that permits it to swivel freely under FULL LOAD.



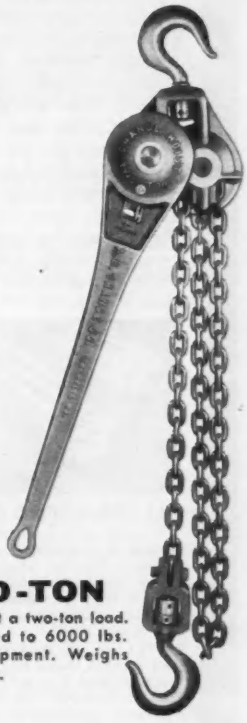
ONE-TON
Rated to lift a one-ton load. Proof-tested to 3000 lbs. before shipment. Weighs only 12 lbs.



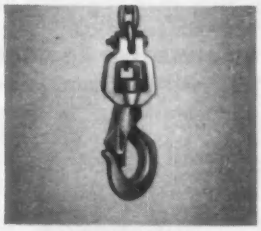
...and a New TWO-TON Capacity

Now... a big brother to the popular Chance One-Ton Hoist... a Two-Ton Hoist with the same mechanical simplicity—plus precision gearing that doubles load capacity. Bigger, stronger, it has all the features linemen from coast to coast suggested in helping to develop the Chance One-Ton Hoist.

Easy-to-grip well-balanced handle operates from either side. "Free-wheeling" for ease in hooking to load. Automatic locking prevents accidental dropping of load. Chain won't bind or kink. Half or full link take up. Controls can be worked with gloves. 360° swivel hook with optional safety latch.



TWO-TON
Rated to lift a two-ton load. Proof-tested to 6000 lbs. before shipment. Weighs only 24 lbs.



SAFETY LATCH HOOK
Optional at slight extra cost.

Order from your line equipment wholesaler.

A·B·CHANCE CO·

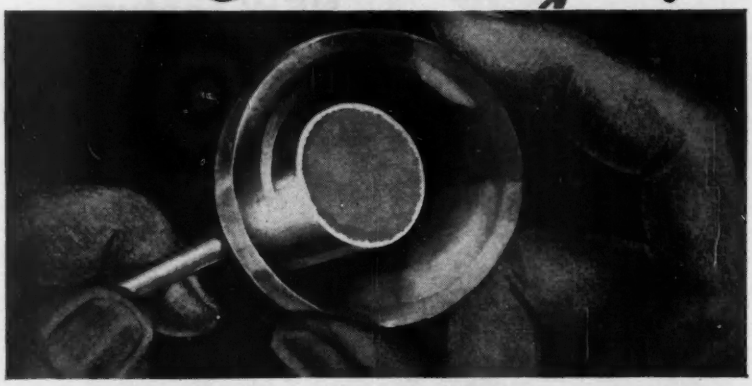
GENERAL OFFICES: CENTRALIA, MO.
(A. B. Chance Co. of Canada, Ltd., Toronto)

CT58-8

It's NEW!

Wire that combines the strength of steel with the high corrosion resistance of aluminum

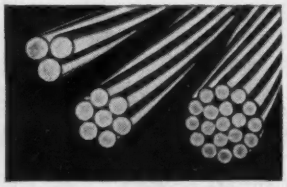
It's ACCO *Aluminized!*



PAGE STRAND

PAGE has successfully combined two time-tested metals into a revolutionary new wire—ACCO ALUMINIZED—that has a ductile, protective coating of aluminum *bonded* to iron and steel wire by a hot-dip method. This product is covered by and is manufactured under processes covered by U. S. and foreign patents.

Now PAGE offers ACCO ALUMINIZED Steel Strand for guy wire, ground wire and messenger wire applications. Can be used with Preformed Guy-Grip dead-ends made of ACCO ALUMINIZED Wire, or with galvanized pole hardware. Here is evidence of ACCO ALUMINIZED Steel Strand's superiority: salt spray tests conducted in strict accordance with ASTM procedures show that, for equal thickness of coating, aluminized *outlasts galvanized by more than 2 to 1.*

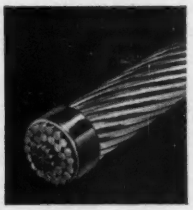


ALL STANDARD GRADES

PAGE ACCO ALUMINIZED Steel Strand is available in Common, Siemans-Martin, High Strength, Extra High Strength and Utility grades with physical properties meeting ASTM Spec. A-122-54-T and A-363-55-T.

NOTE: We will continue to make and market PAGE Stainless Steel Strand and PAGE Galvanized Strand, as heretofore, in 3-, 7- and 19-wire construction.

Also...PAGE *Aluminized* ACSR CORE WIRE



Aluminum Conductor Cable with PAGE ACCO ALUMINIZED ACSR Core Wire is now available from many manufacturers of conductor cable. Product quality control is assured by a special testing procedure mutually developed by PAGE and ALCOA.

Send for Informative Booklet

How about ductility and adherence properties of aluminized wire? Why does aluminizing create a true duplex coating over the core? How does aluminum "sacrifice itself" to provide electrochemical protection? For answers, write us at Monessen, Pa., asking for Booklet DH537-A.

ACCO for Better Values

Page Steel and Wire Division
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

ACCO

M & M BRIEFS

Delta-Star Electric Div, H. K. Porter Company, Inc, New York, will publish a catalog for their new line of aluminum connectors this spring. It will include description of the types of connectors available and technical data for proper installation.

Sylvania Electric Products, Inc, New York, has been awarded a Civil Aeronautics Administration contract for 25 sets of flashing airport runway identification lights that assist approaching planes in locating the landing area during bad weather landings.

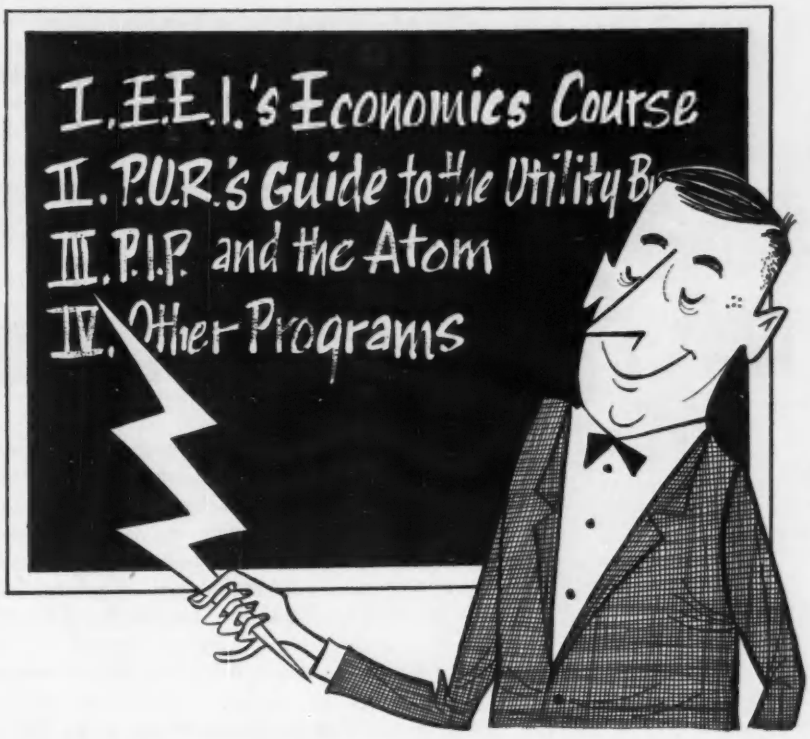
Aluminum Company of America, Pittsburgh, Pa., can produce Expandable Tube-Sheet. This is a one-piece unit of aluminum sheet, or plate, containing a series of lengthwise, parallel areas that can be expanded easily to form integral tubing. The product is suited to solve heating and cooling problems found in many industrial processes, without complicated joining or fabricating procedures.

Eastman Kodak Co, Rochester, N. Y., produces a photo-recording paper which makes possible immediate read-out without processing. Designated as Kodak Linagraph Direct Print Paper, a legible record is visible immediately, at low recording and writing speeds, and within 10 sec after post-exposure to flourescent light, at higher recording speeds.

Bendix Computer Div, Bendix Aviation Corp, Los Angeles, Calif., has produced its 100th G-15 medium size general purpose computer. The machine was delivered to Dow Chemical Co's Textile Fibers Dept, in Lee Hall, Va., for development of a new fiber, Zefran.

W. R. Grace & Co, New York, has formally opened two new facilities, a $20-million polyethylene plant for Polymer Chemicals Division at Baton Rouge, La., and a $5-million research center near Clarksville, Md., for Davison Chemical Division and Grace Research and Development Division.

Report on
Training
Programs



Spread the Word to Employees

The move toward employee information programs is getting up speed in the electric utility industry. More and more companies are offering broad training programs. Some are teaching atomic energy to meter readers and the fundamentals of economics to their billing clerks. Some hold discussion groups to teach newly-hired engineers the principles of rate making.

There are good reasons for these activities:

• **Broad training programs make it easier for management to communicate** with employees. The billing clerk who studied economics will understand the company's pricing policy better than he did before he took the course. Training outside an employee's specialized job generally makes him a more satisfied employee. Because he understands more about the company's overall operations, he can see that management and the employee are "both working the same side of the street."

• **Broad training helps prepare the employee to assume bigger responsibilities** in the future. That young engineer who participated in the rate-making discussion group may some day move into top management and become intimately concerned with rates. At every level it is easier for a promising employee to move up if he has an idea of the problems of the higher echelons.

• **Employees are a great, underdeveloped source of good public relations.** That meter reader who picked up the facts about the electric industry's participation

in atomic power development—and particularly what his own company is doing—will talk about it. And his words will carry more force than a billboard. The informed employee can be the backbone of a company's public relations effort.

There are many good examples of employee information programs developed by a utility company for its own use. These "personalized" training programs are used from coast to coast. In addition, outside agencies have produced some effective broad training programs. Here are brief descriptions of three of them which have come to the attention of Electrical World. All three are designed to be modified by the company that uses them to include information about its own activities—and keep the personal touch.

EEI Teaches Economics

Since the American Revolution, there has appeared a way of life far richer than anything man has done anywhere else in his entire time on earth. Descendents of the colonial gentleman at the left now make up only $\frac{1}{16}$ of the people on earth. They live in a country with only $\frac{1}{19}$ of the land surface of the world. Yet they own $\frac{3}{5}$ of the automobiles, ½ the telephones, ½ the radios, ⅔ of the television sets; they burn $\frac{3}{5}$ of the oil, drink ½ the coffee and use $\frac{2}{5}$ of all the electricity produced in the entire world.—Why?

Because the American free-enterprise system has worked better than any other.

The goal of Edison Electric Institute's revised course in economic fundamentals is to show just how well the American economic system has worked—and to show why it is the best system for all the people which has yet been devised. The course is frankly made to advocate our present free-enterprise system, and it does it very well indeed—in a restrained, heavily documented case.

The course is built around six colored slide films. It is designed to be given to all employees in six conferences of one hour each. EEI recommends that each conference group be held to 30 employees, and that the boss not be present—to stimulate freer discussion. Conference leaders should come from the same employee group as the conferees.

A Leader's Guide gives the discussion leader his text to go with the slide film, and also a realistic approach to leading the discussions that follow the film. The worker is likely to be skeptical when told he can spend six hours away from his job looking at a set of films and discussing them. The guide contains advice on how to break down that skepticism. Proof that the course is not "management propaganda" is furnished by testimonials of employees themselves and endorsement of state and local labor union officials.

The course explains what profits are, and why they are important in our economic system. It also shows how important are tools and machines (example: a classified ad for a locomotive engineer—"Excellent working conditions, top wages, good benefits. We furnish the tracks. Bring your own locomotive.")

Since December 1957, close to two dozen utilities have shown great interest in or purchased the revised course. The first printing of 25,000 books is over 90% exhausted. The 1953 edition, which the present course replaces, earned three George Washington Honor Medals from the Freedom Foundation.

Materials for this course consist of a set of six 35-mm colored slide films ($60), Conference Leaders' Manual ($2), a kit of demonstration materials ($30), and copies of a 96-p illustrated book to be given to each employee after the course. (50¢ each). Two training schools for conference leaders are also available. A four-day course covers content and presentation of "The American Economic System ($75), and a five-day course teaches conference leadership ($85). Additional information is available from Prall Culviner, Edison Electric Institute, 420 Lexington Ave, New York 17, New York.

PUR Explains the Utility Business

"A journey of understanding" is the way Public Utilities Reports, Inc, likes to refer to its course on utility economics. The "journey" lasts for 50 weeks, and by the time it is over the utility employees enrolled have taken a look at almost every non-technical side of the utility business.

The PUR guide is not meant for every employee. Newly employed college graduates and supervisors below the executive level are its targets, although executives have taken the course and found it useful.

The course is designed for either conference instruction or self study. When the conference method is used, a discussion leader's manual is provided. The manual contains further information about side issues that are likely to arise and also several questions to pep up discussion.

Text for the course is a series of 50 weekly, 8-p folders which present a simple, step-by-step story of how the utility business works. The first guide tells about "Starting a Utility Business." It explains what incorporation means, the difference between a franchise and a charter, how money is raised—laying a solid foundation on which the subsequent lessons are built. An early lesson tells how a utility differs from other businesses—why regulation is substituted for competition.

The lessons progress through discussions of value, utility expenses, uniform accounting systems and depreciation, profit from utility operation, and fair return into six lessons that deal with rate making.

Another progressive block of guides deals with utility financing, including security regulation and how a security issue is made. Other lessons and groups of lessons concern organization and management, merchandising and customer service, labor relations, and public relations.

The guide offers no solutions to controversial issues, but it does not avoid them. Late in the course lessons deal with the federal power policy, Tennessee Valley Authority and rural co-ops. Two lessons consider the utility holding company. By the time a student gets to lesson number 50, entitled "Private Utilities in the American Economy", he has had a chance to absorb enough knowledge to talk and think intelligently about the utility business as a whole.

The program has been well received. Six months after its inception last April, more than 130 companies were participating. Perhaps the most flattering testimonial came from a district manager of an electric company: "My only regret is that this was not available to me many years ago."

Cost for enrollment is $50. Voluntary examinations at midterm and at conclu-

sion of the course are included in the program, and an appropriate certificate is issued upon satisfactory completion of the course. For further information contact Frederick A. Lavey, vp, Public Utilities Reports, Inc, 332 Pennsylvania Bldg, Washington 4, D. C.

PIP Talks about the Atom

"The Atom in Our Business" is the title of a packaged employee discussion program from PIP, the Electric Companies Public Information Program. It can be presented in a single session, or expanded if desired.

The basis of this program is a 45-minute talk to be given by employee discussion leaders. Its objective is to bring the employee up to date on atomic power. The talk is illustrated by 30 semi-glossy photographs, drawings, and charts suitable for projection and keyed to the talk. Here's an outline:

- **The talk begins by explaining how the atom is made and how it can be split.** It goes on to describe and illustrate a nuclear power plant, and to show how it can be used to **generate electricity.**
- **It explains the different basic types of reactor**—citing examples of reactor types now under construction.
- **It makes the point that nuclear plants are expensive,** and will not compete in price with conventional plants here in the U. S. for a long time.
- **It points out that the U. S. electric utility industry is now building** nuclear plants all over the country in order to have low-cost nuclear electricity available when it is needed.
- **It stresses that nuclear plants are designed for safety.**

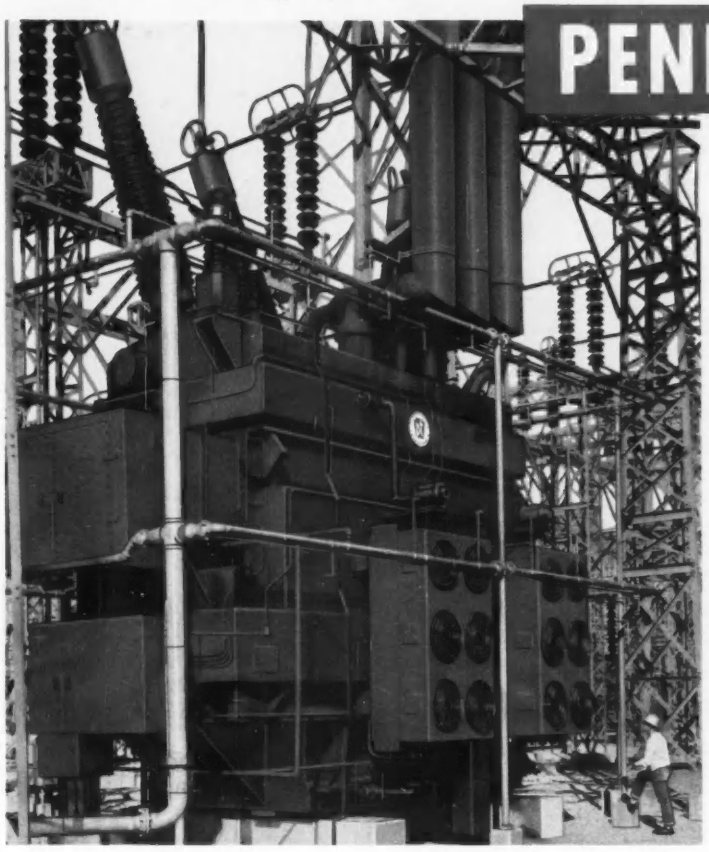
The package also contains background material—Walt Disney's paperbacked "Our Friend the Atom" and three booklets by Consolidated Edison Co: "Atomic Energy, Why?", "Atomic Energy, How?", and "Atomic Power and Safety."

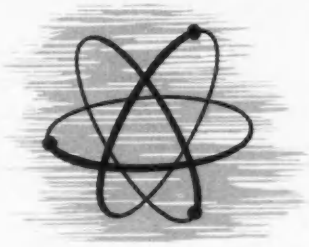
PIP also recommends two films to supplement the illustrated talk and discussion. These are "The Atom Comes to Town" (produced by the U. S. Chamber of Commerce) and Disney's "Our Friend the Atom."

Here are some other broad training programs that may aid your company . . .

- **Edison Electric Institute** has several other courses on the order of "The American Economic System" now in the early stages of development.
- **Rutgers University,** at New Brunswick, N. J., conducts a course for industrial foremen which has been attended by employees of Central Hudson Gas & Electric Co. The company reports that it has been pleased with the results.
- **Several universities, including Michigan, Idaho, Columbia, and Georgia Tech,** have held management seminars for utility executives. These seminars will be the subject of a later management newsletter.

FOR 330 Kv POWER . . .
Atomic Energy Plant Relies on Two 100,000 Kva Transformers by PENNSYLVANIA





LOAD TAP CHANGING PENNSYLVANIA POWER TRANSFORMER

. . . one of two 100,000-kva Pennsylvania transformers located at the Portsmouth, Ohio, plant of the Atomic Energy Commission. The transformers step down a transmission voltage of 330,000 volts to 14,400 volts for plant distribution.

Two 100,000-kva Pennsylvania Power Transformers play a key role in the distribution of power throughout the Atomic Energy Commission's Portsmouth plant. With a high voltage rating of 330,000 volts, these "step-down" units are among the highest voltage transformers ever manufactured for use in this country. Their integrated load tap changing equipment boasts the "quiet ruggedness" that is so desirable in most present-day installations.

Other Pennsylvania features include corona-free high voltage coils that are designed for uniform impulse voltage distribution . . . and of course the well-known Pennsylvania "Contour Design" construction, which results in space-saving, weight-saving compactness.

McGRAW EDISON

For the full story on these and other Pennsylvania design and construction details, you are invited to contact Pennsylvania Transformer Division, McGraw-Edison Company, Box 330, Canonsburg, Pa.

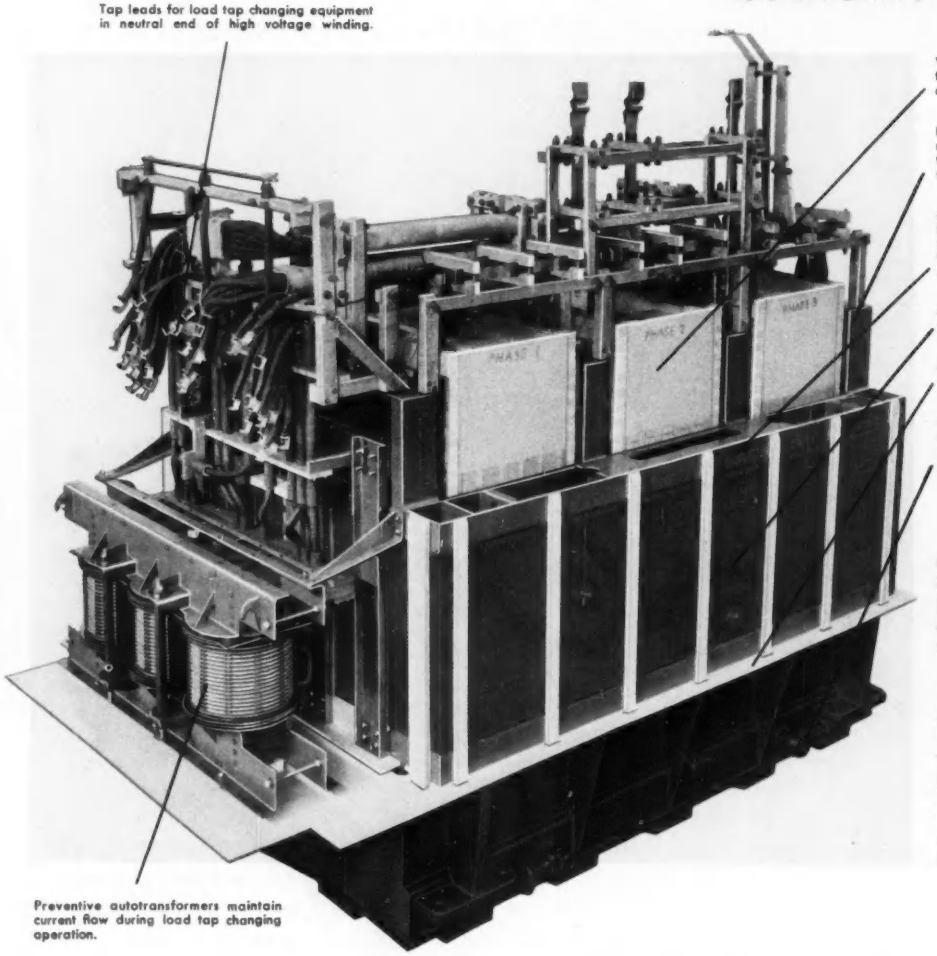
PENNSYLVANIA TRANSFORMERS pt

PENNSYLVANIA POWER TRANSFORMERS

See other side for design details

330 Kv Pennsylvania Power Transformer

ONE OF TWO 100,000 Kva PENNSYLVANIA "*CONTOUR DESIGN*" LTC POWER TRANSFORMERS . . . in Step-Down Service at Atomic Energy Plant


Tap leads for load tap changing equipment in neutral end of high voltage winding.
Vertical cooling ducts in coils permit free flow of oil through coils for most efficient cooling.
Heavy box sections which form part of core frame securely clamp coils to protect against mechanical forces during short circuits.
Core and coils clamped together with heavy steel frames to form a rigid structure. Core-and-coil unit can be handled separately as a complete sub-assembly.
Core cooled by both vertical and horizontal ducts.
Core-and-coil assembly rests on flange of bottom section of Contour Design tank.
Oil-distribution duct completely circles bottom of tank. Cooling oil from heat exchangers thus is evenly distributed upon re-entering tank.
Preventive autotransformers maintain current flow during load tap changing operation.

Interior view of one of two identical Pennsylvania transformers serving the Portsmouth, Ohio, plant of the Atomic Energy Commission.

100,000 kva, three phase, 60 cycles, 55°C. temperature rise. Forced-oil, forced-air-cooled, with four heat exchangers. High voltage: 330,000 Grd. Y volts. Low voltage: 14,400△ volts. Load tap changing equipment for ±10% regulation in 32 steps of ⅝%.

Pennsylvania has the *Facilities* and the *Capability* to meet the Largest Power Transformer Requirements...

- A large, expertly-staffed engineering department with long experience in power transformer design—both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.

McGRAW EDISON

PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for installation view . . .

News About People

Duquesne Light Advances Conwell to VP Post

Newly elected vice president for the Engineering and Construction Division of Duquesne Light Co is William A. Conwell.

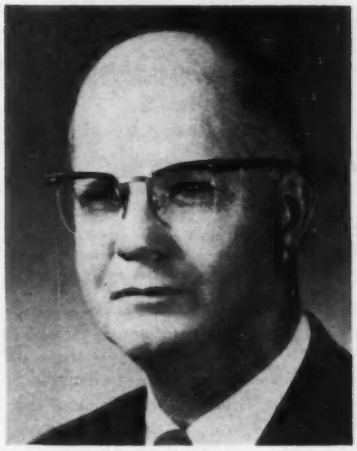
Conwell moves into this position from that of structural engineer in the company's design department. During his association with Duquesne Light, which began in 1937, he has supervised structural engineering for the Shippingport atomic power station and Elrama power station, and extensions to Phillips and Reed power stations. In addition, he supervised the design of flood protection for Colfax and Reed stations.

Conwell's engineering experience prior to his affiliation with Duquesne Light includes service with Gibbs and Hill, consulting engineers; Allegheny County Authority; and Pennsylvania Railroad.

A 1929 graduate of Carnegie Institute of Technology, Conwell later received his MS degree in civil engineering and the degree of Civil Engineer.

WILLIAM A. CONWELL

Iowa Southern Ups Jennings



F. M. Jennings has been elevated from superintendent-system construction to manager of engineering and construction for Iowa Southern Utilities Co. His appointment fills the vacancy created by the death of H. W. Benda.

In his new position, Jennings assumes responsibility for overall supervision of all phases of major system electrical engineering and construction work.

In simultaneous appointments, the company promoted F. W. Creech to superintendent-system construction; L. H. Criswell, to assistant to superintendent-system construction; H. C. Sweet, to supervisor-design engineering; R. F. Brewer, to manager-electric operations; D. H. McLeod, to superintendent-system production; and E. P. Walsh, to supervisor-operations and planning.

Porter Has New Sales VP

H. K. Porter Co, Inc, recently announced the appointment of Burton Schellenbach as vice president in charge of sales for the company. He will headquarter in the company's offices in Pittsburgh, Pa.

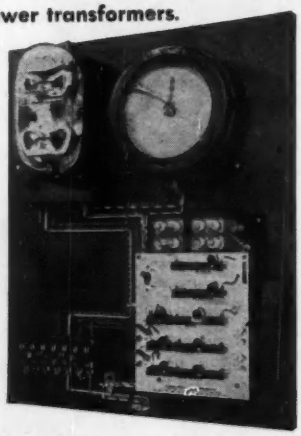
Schellenbach, who has gathered almost 25 years experience in marketing, most recently was associated with Fuller & Smith & Ross, Inc. During his 12 years with that agency, he had served as vice president in charge of marketing and advertising efforts for Aluminum Co of America, and as director of marketing and chairman of FSR's plans board in Cleveland.

During his career, Schellenbach has also worked with the sales and marketing managements of Fafnir Bearing Co, Nicholson File Co, The Stanley Works, Union Carbide Corp plastics divisions, and John A. Roebling's Sons Co.

Transformer Loss Compensator

Saves you Money!

BECAUSE it provides an accurate means of measuring the energy and demands of high-voltage services at the low-voltage side of the power transformers.



This installation at 2.3 kv saved about $2600 compared with 34.5 kv metering; it saves about $5500 over metering at 69 kv.

THE TESCO compensator adds to the registration of the watthour meter an amount equal to the sum of the iron and copper losses of the transformer bank. It may be used with practically any type of watthour meter and . . . importantly . . . no changes are made in the meter itself, either structurally or in adjustments . . . It is produced in two and three element types for use with two-element or three-element meters on any type circuit.

Some of the Users . . .

Phila. Electric Co. Penna. Power & Light Co. Texas Power & Light Co. U. S. Bureau of Recl. Public Service Co. of New Hampshire. Utah Power & Light Co. Northern States Power Co.

Get your book now. FREE

Detailed information on operation, installation, applications. Write for Bulletin NO. 63-A.

EASTERN SPECIALTY CO.

PHILADELPHIA 40, PA.

Sales Exec Named

Perry M. Green, Jr, has joined Kuhlman Electric Co as general sales manager of the Transformer Division. He is former sales manager, unit substations for BullDog Electric Products Co.

Green now heads the sales activities of Kuhlman's 56 sales offices and three regional factories at Bay City (Mich.), Crystal Springs (Miss.), and Salinas (Calif.).

Sanford Becomes VP

Newly named vice president in charge of manufacturing for Crouse - Hinds Co is Charles W. Sanford. He was named to succeed the late Albert H. Clarke.

Sanford, formerly manager of foreign operations for Philco Corp, now directs and coordinates all manufacturing, industrial engineering, production planning, and procurement for Crouse-Hinds.

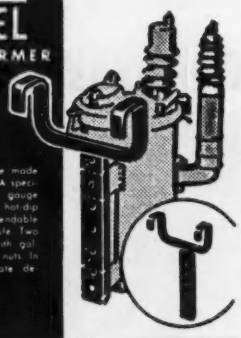
PERSONAL BRIEFS

The operating dept of Niagara Mohawk Power Corp recently named **Ferdinand J. Schneider** general superintendent of operations, Western Division; **James Bartlett,** general superintendent of operations, Central Division; **Ewart G. Smith,** assistant general superintendent-operations, Western Division; and **C. Harry Anderson,** system supervisor of construction, Western Division.

At Public Service Co of Oklahoma, **Richard O. Newman** has been made assistant superintendent of operations and construction in charge of production; **Russell E. Linton,** elec-

(*More briefs on page* 110)

THIEL TRANSFORMER HANGERS

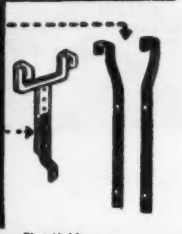


THIEL Hangers are made according to NEMA specifications — heavy gauge steel construction, hot dip galvanized for dependable service and long life. Two styles complete with galvanized bolts and nuts in stock for immediate delivery.

MODEL	1-PHASE	3-PHASE	WEIGHT
T-1	3-15 KVA	9 KVA	16¼ lbs.
T-2	25—37—50 KVA	15-45 KVA	37¼ lbs.

C-TYPE HANGERS
Two sizes — for 75-100 KVA 1 phase and 75-112½ KVA 3 phase transformers.

HANGER KICKERS
In sizes to fit T-type Hangers — in four and five mounting positions.



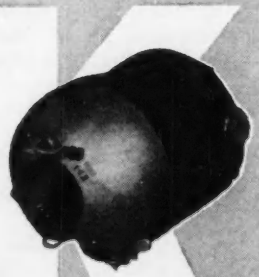
Electrical Fasteners That Hold . . .

THIEL TOOL & ENGINEERING CO. INC.

1417 No. Market St. • St. Louis 6, Mo.

THE BEST WAY TO INSTALL CABLE

"is to spin it"



For information Write, Wire or Phone

CABLE SPINNING EQUIPMENT CO.

3100 Topeka Ave. Topeka, Kans.

Here's how Roebling VCV works!

1 Strand wrapped in semi-conducting tape goes up through 4-story, high-temperature tube. This drives out gases and moisture from core, and preheats the conductor for more uniform curing.

2 Conductor is put under controlled tension, which is maintained during entire insulating process.

3 Butyl insulation is extruded downward around conductor.

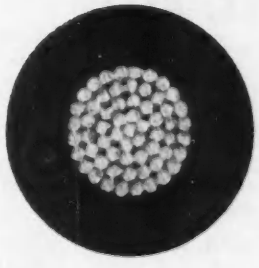
4 Vulcanization takes place continuously and uniformly in vertical tube. Constant high steam pressure assures dense, sound insulation.

5 Insulation never touches anything until high-pressure water cooling is complete. The result is unvarying roundness, smoothness and concentricity of butyl insulation.

The Conductor is Always Dead Center

ROEBLING

VCV



ROEBLING'S 15 KV CABLE HAS UNIFORMLY HIGH CORONA LEVEL AND DIELECTRIC STRENGTH. VERTICAL CONTINUOUS VULCANIZATION ASSURES UNUSUALLY LONG TROUBLE-FREE CABLE SERVICE.

If you sliced a length of Roebling's VCV 15 kv Cable into cross sections, you'd find that *every inch* is uniform, every inch is round, and in every inch the conductor is exactly centered!

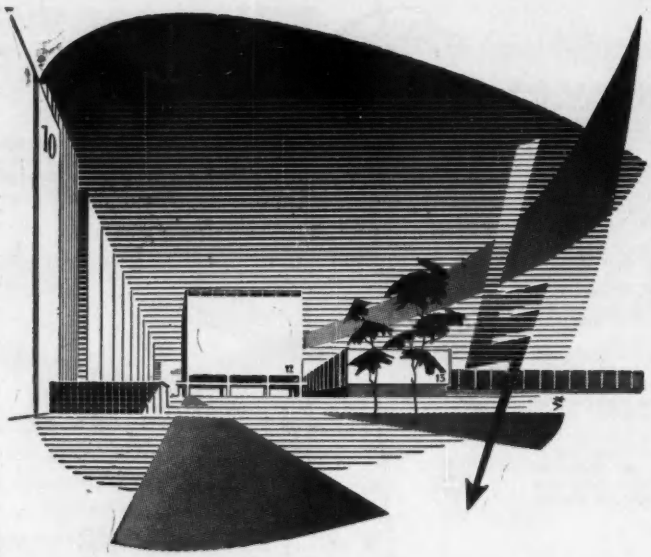
VCV is responsible for the exceptional quality of this new high-voltage cable. No longer will you buy cables in which the conductor has "snaked," or that has flattened, scraped, blistered or abraided insulation. Because insulation is the same thickness and density for the length of the cable, dielectric strength and corona level are uniformly high.

ROEBLING VCV 15 kv CABLES are available in a complete range of conductor sizes and insulation thicknesses

Write today for more facts about the longer, better service you'll get with Roebling VCV High-Voltage Cable. Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation



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Personal Briefs

(*Continued from page* 108)

trical engineer for the production section; **Warren E. Davis,** maintenance supervisor for generating stations; and **Merle J. Lindburg,** mechanical test engineer.

Richard D. Peterson succeeds retiring **Fred R. Spaulding** as Colfax district manager for Iowa Power & Light Co. Appointment is effective June 1 . . . Alabama Power has named as district superintendents **M. S. Park, Jr,** at Demopolis; **J. H. Shirley,** at Montgomery; and **R. E. Ledyard, Jr,** at Selma.

The Engineering and T&D Depts of Gulf States Utilities Co recently named **J. W. Baird** Beaumont station engineer and **H. G. Fitzgerald** Beaumont operating engineer. In the production dept, **W. A. Whitten** became superintendent at Neches Station; **A. H. Demers,** superintendent of Roy S. Nelson Station; and **Floyd T. Langlois** office engineer at Neches Station.

New assistant division managers at Montana Power Co are **Edmund D. McGonigle,** at Butte; **Leonard D. Regan,** Great Falls; and **Joseph L. Weis,** Missoula.

Commonwealth Edison Co has appointed **Charles Clark** as district superintendent in Chicago-North and **D. F. Morrison** as district superintendent in Chicago-Central.

Thomas Brown is new administrative engineer, electric operations, at Philadelphia Electric Co.

Kansas City Power & Light Co's **C. C. Cornelius** has retired as manager of construction and maintenance after 37 years with the firm.

C. H. Bartlett has been elevated to executive assistant to **A. C. Monteith,** vice president and general manager of Westinghouse Electric Corp's apparatus products group. He's succeeded as manager of the Manufacturing and Repair Divisions by **H. R. Larson** . . . The Lamp Division has named **Howard J. Thomas** as manager of wholesale and utility sales . . . **F. G. Saviers** is new assistant to the controller of

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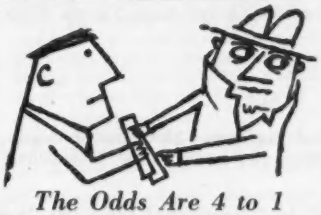

The Odds Are 4 to 1

When busy engineers and executives in the dynamic electric power industry get around to naming the one magazine they find most useful in their work, it's ELECTRICAL WORLD, by a margin of 4 to 1. Year after year, survey after survey, WORLD earns *at least* four times as many votes as any other magazine in the field.

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Westinghouse . . . Recently awarded the company's Order of Merit were these Bettis Atomic Power Division engineers: **Joseph C. Rengel,** manager of the Shippingport project; **William R. Ellis,** manager of the power plant section of Shippingport; and **Nunzio J. Palladino,** manager of reactor design, Shippingport.

David H. Crimmins, Jr, has been appointed assistant engineer in reactor dynamics in Allis-Chalmers Manufacturing Co's Nuclear Power Division . . . The Power Equipment Division has named **Richard L. Burt** application engineer, steam turbine dept; and **Joseph B. Fronapfel, III,** assistant engineer, regulator dept . . . **Thomas E. Bryan** has become an application engineer in the electrical application dept.

James Land, Jr, is new sales manager of Zinsco Electrical Products' Northern California Division.

OBITUARY

Dr Comfort A. Adams, 89, often called the dean of American engineers, died recently at his Philadelphia home. He was 1957 recipient of the Edison Medal of American Institute of Electrical Engineers and was awarded AIEE's Lamme Medal in 1940.

Frederick W. Drager, 82, retired treasurer of American Gas & Electric Co, died in Summit, N. J.

A. Warren Egger, 57, comptroller and assistant secretary of Central Illinois Light Co, died in Pekin after an illness of several months.

William F. Gilman, 75, retired vice president of Cape & Vineyard Electric Co, died recently.

Dr Thomas H. Hogg, 73, former chairman of Ontario Hydro-Electric Power Commission, died suddenly in Toronto.

Ralph M. Miller, 63, executive vice president of New Bedford Gas & Edison Light Co, died from a heart ailment at Fair Haven, Mass.

Robert M. Salvant, 67, vice president and secretary of Louisiana Power & Light Co, died suddenly in New Orleans.

COMING APRIL 1958

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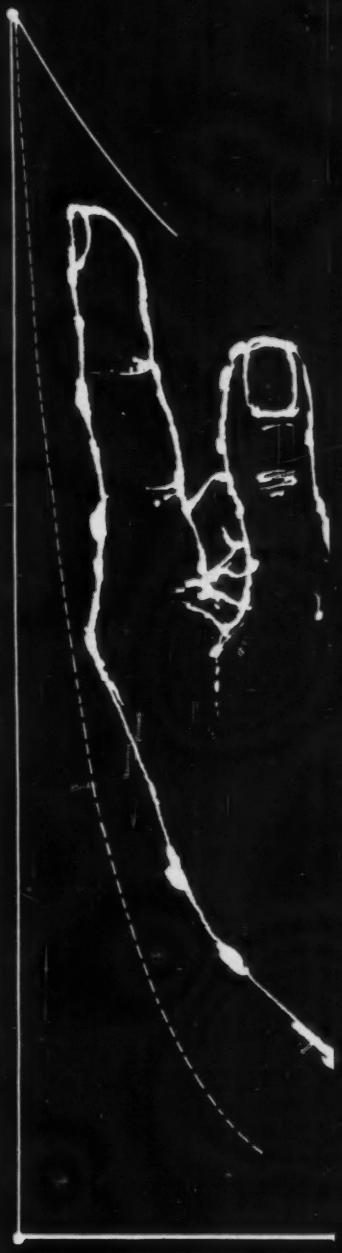

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The Meetings Calendar

MARCH

Electric Companies Public Information Program — Steering Committee, Biltmore Hotel, New York City, March 12; Mid-Atlantic Regional Meeting, Baltimore, Md., March 19.

• **American Institute of Electrical Engineers**—Textile Conference, Georgia Institute of Technology, Atlanta, Ga., March 13-14.

Nuclear Congress—Co-sponsored by American Society of Mechanical Engineers and the Engineers Joint Council, International Amphitheater, Chicago, Ill., March 16-22.

Interstate Power Club — Hotel Martinique, New York City, March 17.

American Council To Improve Our Neighborhoods—Building Industry Congress on Urban Renewal, co-sponsored by the National Housing Center, Washington, D. C., March 17-18.

National Association of Corrosion Engineers—Annual Conference & Exhibition, Municipal Auditorium, San Francisco, Calif., March 17-21.

American Institute of Electrical Engineers and American Society of Mechanical Engineers—Joint Management Conference Committee, Hotel Somerset, Boston, Mass., March 19-20; Southwest District Meeting, Mayo Hotel, Tulsa, Okla., March 31-April 2.

Edison Electric Institute — Industrial Relations Committee, Headquarters, New York City, March 20; Annual Sales Conference, Edgewater Beach Hotel, Chicago, Illinois, March 24-27.

Institute of Radio Engineers—National Convention, Waldorf-Astoria Hotel and New York Coliseum, New York City, March 24-27.

Northwest Public Power Association—Engineering and Operations Section, Clark County PUD Electric Center, Vancouver, Wash., March 26-27.

American Power Conference—20th Anniversary Meeting, Sherman Hotel, Chicago, Ill., March 26-28.

Oklahoma Utilities Association — Annual Convention, Oklahoma Biltmore Hotel, Oklahoma City, Okla., March 27-28.

Pacific Coast Electrical Association—Engineering & Operation Section, Sheraton Palace, San Francisco, California, March 27-28.

Electrical Maintenance Engineers Association of Southern California—Industrial Electric Show and Conference, Shrine Convention Hall, Los Angeles, Calif., March 27-29.

Agricultural and Mechanical College of Texas—First Annual Texas Conference on the Utilization of Atomic Energy, College Station, Texas, March 31-April 2.

Southeastern Electric Exchange—Annual Meeting, Boca Raton Hotel and Club, Boca Raton, Fla., March 31-April 2.

APRIL

Rural Electrification Administration — 9th Annual Electric Generating Plant Operation and Maintenance Conference, Phoenix Hotel, Lexington, Ky., April 7-10.

Indiana Electric Association—Young Men's Utility Conference, Evansville, Ind., April 8-9.

Microwave Research Institute — Symposium on Electronic Waveguides, held in cooperation with Institute of Radio Engineers, New York City, April 8-10.

Rocky Mountain Electric League—Spring Conference, Shirley-Savoy Hotel, Denver, Colo., April 13-15.

American Institute of Electrical Engineers—Rubber and Plastics Industries Subcommittee, Mayflower Hotel, Akron, Ohio, April 14-15; Middle Eastern District Meeting, Washington, D. C., April 28-30.

Agricultural and Mechanical College of Texas—11th Annual Conference for Protective Relay Engineers, College Station, Texas, April 14-16.

Edison Electric Institute—National Conference of Electric and Gas Utility Accountants, held jointly with AGA, Shamrock Hilton Hotel, Houston, Texas, April 14-16; Industrial Relations Committee, Headquarters, New York City, April 17; Accident Prevention Committee, Commodore Perry Hotel, Toledo, Ohio, April 27-30; Purchasing and Stores Committee Meeting, Hotel Nicollet, Minneapolis, Minn., April 28-30.

American Welding Society—Sixth Annual Welding Show, and Technical Meeting, Kiel Auditorium and Hotel Statler, St. Louis, Mo., April 14-18.

Missouri Valley Electric Association—Engineering Conference, President Hotel & Municipal Auditorium, Kansas City, Mo., April 16-18.

Northwest Public Power Association, Inc—Annual Membership Meeting, Ridpath Hotel, Spokane, Wash., April 16-18.

Southeastern Electric Exchange—Engineering and Operations Meeting, Buena Vista Hotel, Biloxi, Miss., April 21-23.

Pacific Coast Electrical Association — Administrative Services Section, Hotel Valley Ho, Scottsdale, Ariz., April 23-24.

Pennsylvania Electric Association—Meter Committee, Galen Hall Hotel, Wernersville, Pa., April 24-25.

Northwest Electric Light & Power Association—Engineering & Operating Section, combined with Personnel & Safety Section and Purchasing Committee, Chinook Hotel, Yakima, Wash., April 23-25.

MAY

American Society of Tool Engineers—26th Annual Meeting and Tool Show, Philadelphia Convention Center, Philadelphia, Pa., May 1-8.

Edison Electric Institute—Area Development Committee, New York City, May 1; Commercial Cooking Conference, Chicago, Ill., May 6.

Air Conditioning and Refrigeration Institute—Annual Meeting, The Homestead, Hot Springs, Va., May 4-7.

National Electrical Contractors Association—Districts Six, Eight, and Nine Annual Conference, Hotel Biltmore, Los Angeles, Calif., May 5-7.

• Additions this week.

MORE BIG DATES FOR '58

Edison Electric Institute—26th Annual Convention, Boston, June 9-12.

American Institute of Electrical Engineers — Summer General Meeting, Buffalo, June 22-27.

National Electrical Manufacturers Association—Annual Meeting, Atlantic City, Nov. 10-14.

National Association of Railroad and Utilities Commissioners — Annual Convention, Westward Ho Hotel, Phoenix, Ariz., Nov. 17-20.

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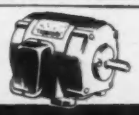

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Readers Forum

LBE Plans Set for '58

To the Editor:

An answer to the interesting question—will 'Live Better Electrically' be adopted into the EEI family—raised in the Late News section of Electrical World's Feb. 24 issue requires a little perspective. Live Better Electrically national plans have been set for 1958, which we anticipate will be the program's most successful year to date. We are planning ahead for 1959, providing for necessary continuance of the already-accepted Medallion Home campaign and increased promotional efforts by retailers throughout the country.

Edison Electric Institute has closely cooperated with the Live Better Electrically program from its inception in 1956. As your publication noted, electric utilities are studying various avenues of intensifying their cooperation and participation during 1959. Naturally, the Live Better Electrically program will closely coordinate its activities with related promotions by all segments of the industry next year.

Robert E. Boian
Mgr., Live Better Electrically Project

New York 17, N. Y.

Hard At Work on R/W

To the Editor:

I am planning to attend Electrical World's Chicago electric utility right-of-way conference, and looking forward to seeing you again.

This year I have directed the acquisition of over 200 miles of right-of-way 150 feet wide for the 110 kv grid system of transmission lines to distribute Vermont's allotment of the "St. Lawrence Power" and right-of-way problems are of vital interest to me.

R. A. Noble
Real Estate Agent

Central Vermont Public Service
Rutland, Vermont

"Accountants Can Help..."

To the Editor:

I would like to express my appreciation for your personal help in modifying the article, "Accountants Can Help You Manage" (EW, Jan. 27, p 80) so as to meet the space requirements of Electrical World and yet not lose any significant points.

You will be interested in knowing that I have received several favorable comments about the article, perhaps the most significant being a request for further information from J. H. Coates of Ebasco Services who was kind enough to say that he felt our program represents a real contribution to utility sales management.

Carl L. Richey
Assistant General Manager
Sacramento Municipal Utility Dist.
Box 2391
Sacramento 11, Calif.

Coal Editorial Interesting

To the Editor:

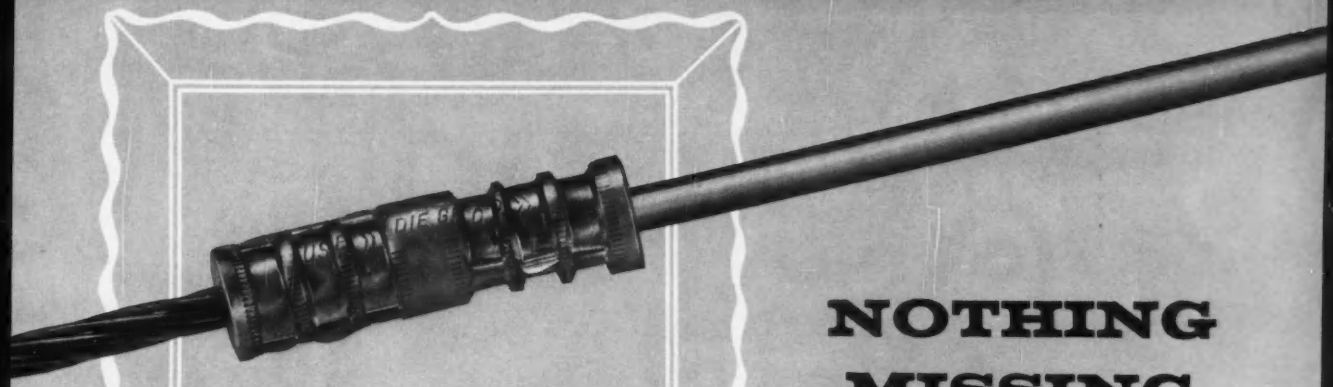
I read with interest your editorial comment, "King Coal Becomes King" on page 39 of your issue of February 10 and was pleased to receive a second copy from the Appalachian Coal Institute.

If you have run off a few extra copies, possibly 10-15 which are available to me, I should like to give them some discrete circulation.

Winthrop C. Swain

Draper, Sears & Co
50 Congress Street
Boston 2, Mass.

Readers Forum is your column in Electrical World. We invite queries, comments, criticism. For space reasons, it is sometimes necessary to shorten letters, but every attempt is made to preserve the viewpoint and the feeling of the writer in every letter printed here.



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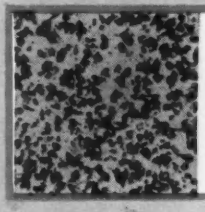

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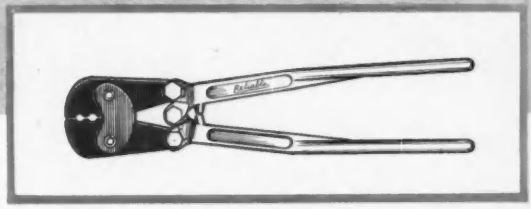

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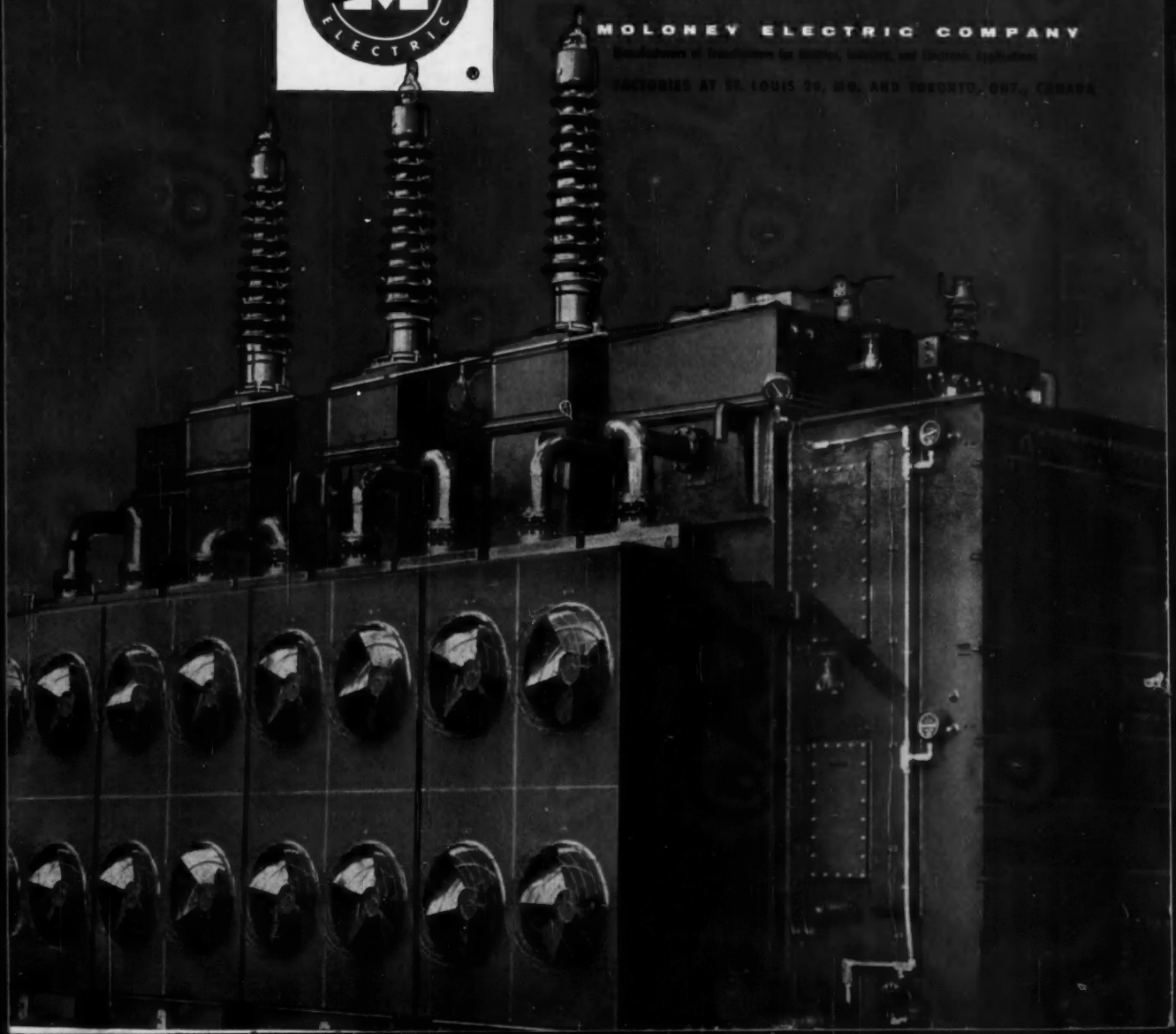
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